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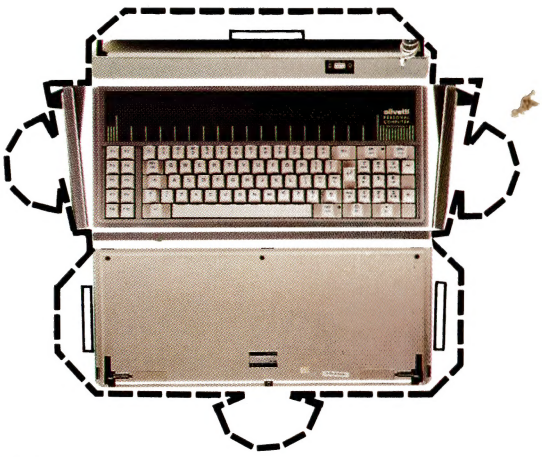

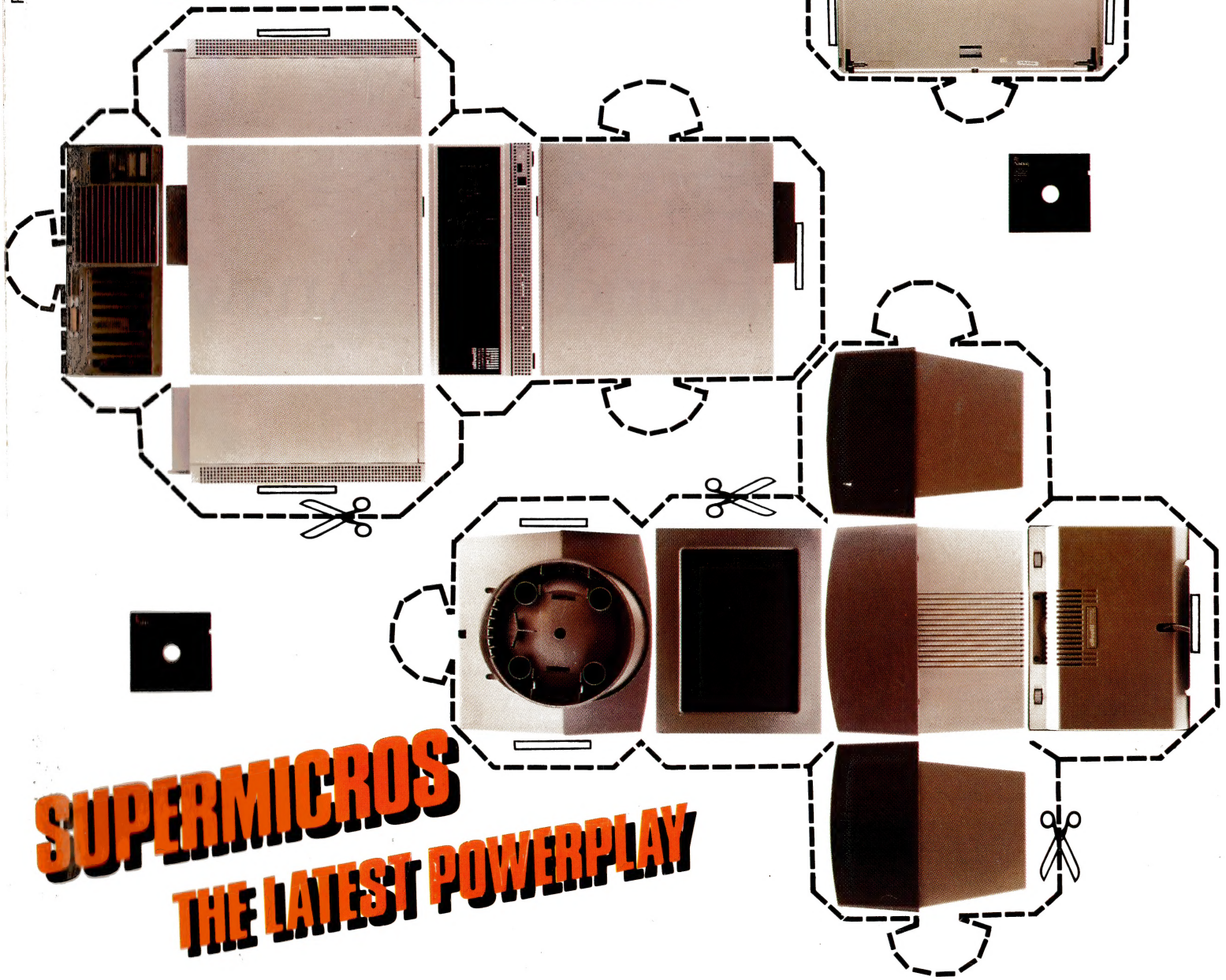

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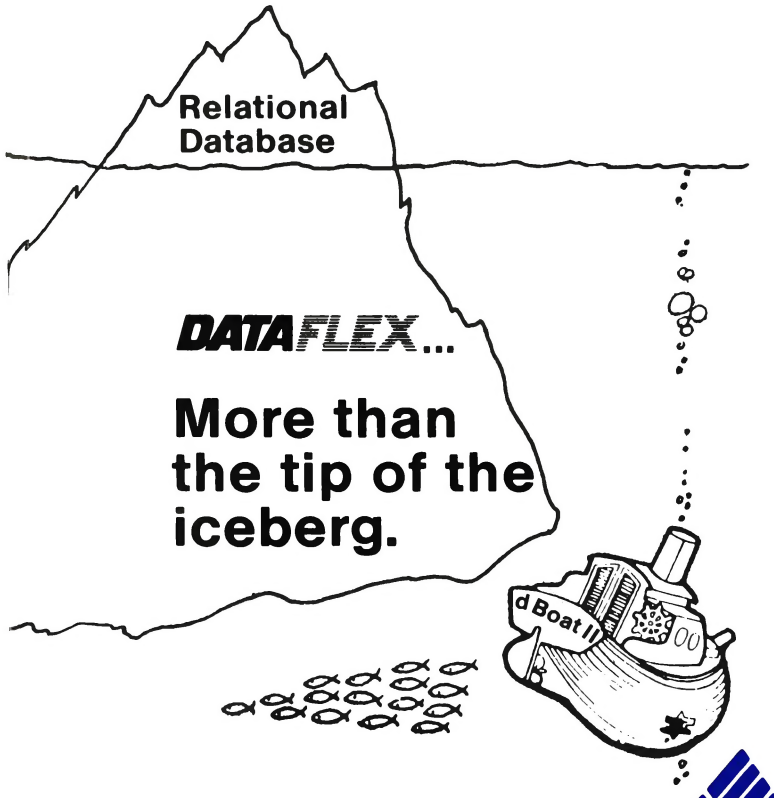

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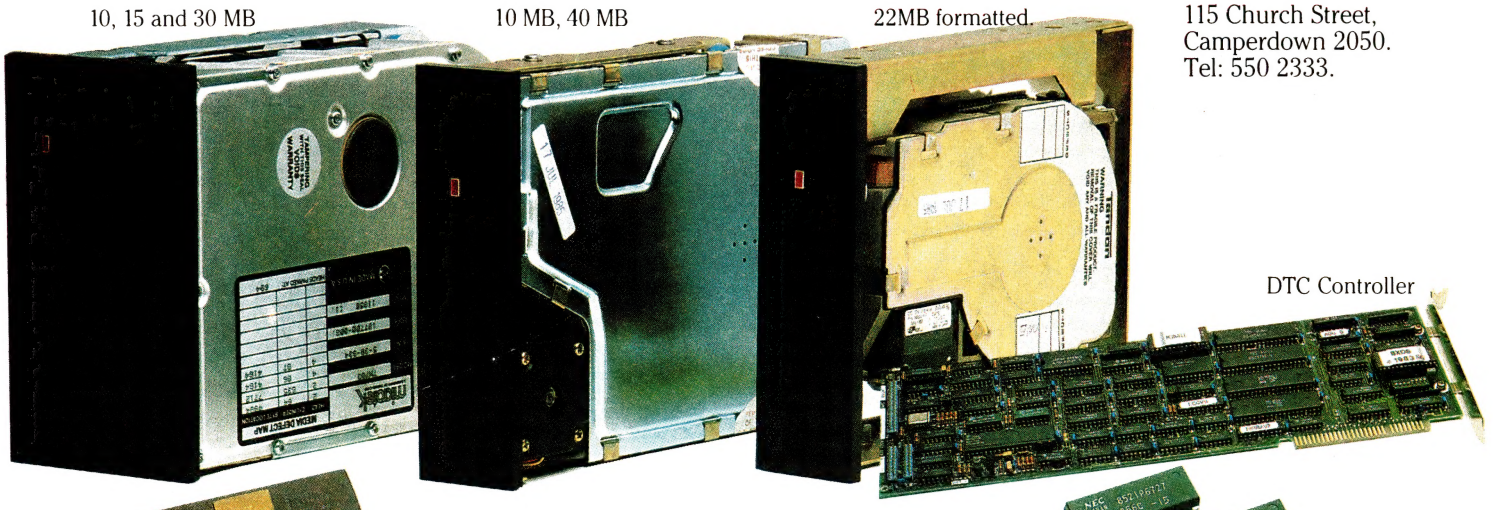

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What PC *Market?*

The daily press has recently been full of comment on the internecine squabbles at Apple. 'Oh! How the mighty are fallen!' is the catch-cry, as the press watches the personal computer industry, which could previously do no wrong, crumbling around the edges.

For that is what the Apple situation is about, make no mistake. It has little to do with personality clashes at the top; Steve Jobs specifically head-hunted John Scully into the top job at Apple and the two were extremely close during Scully's early days at the company.

The fact is that Apple no longer needs a visionary at the top. Times are tough, and this is business. There's lots of competition out there and deals are going to have to be done to keep the business moving.

Other companies are finding the same thing. Lotus, for example, has been disappointed by sales of Symphony, its IBM PC integrated software package, and Jazz, its Macintosh package. Other manufacturers of integrated software are finding the same thing.

Even IBM has the problem, with warehouses full of PC Jrs and no-one to buy them.

Why has this happened? The answer is very simple, almost embarrassingly so. The fact is that many planners in the PC industry just haven't done their homework. Their sales forecasts are based on exponential growth which is simply not achievable.

Right now, almost everyone who could benefit from a personal computer already has one. Most of those who want a PC have one. What's left? People who don't need and don't want personal computers, plus some repeat sales to previous users. And that's a hard row to hoe.

Apple obviously sensed some of this when designing the Lisa and the Macintosh. But while these machines are easier to use, they still address the same class of technical management problems as other PCs. In addressing the needs of people who are put off by the high verbal/numerical skills required by conventional PCs, they overlooked the fact that the user will still have to have such skills in order to have a need for a PC in the first place.

In other words, people who couldn't use a conventional PC probably don't have a need for one at all.

The theory of diffusion of innovation supports my belief. This is a classical marketing theory that says that the market for any innovative product category follows a bell-shaped curve, sloping up to a peak and then falling away again.

The point of maximum slope on the left side of the curve is the point of maximum profitability for those in the market. We are now well beyond that point, having achieved it late last year. With profitability now dropping unexpectedly, there is no longer room in the industry for visionaries like Steve Jobs, Gary Kildall and others. What is required is not vision, but tight control over costs, good marketing, and other traditional business skills.

Unfortunately, the personal computer as it stands is a visionary product; the people who use it have to be innovative and highly motivated, and the market of innovative and highly motivated users is all but dried up.

This is the real shake-out. It's not the large companies ruthlessly crushing the small ones (although some of the large companies are better placed to survive); it's simply a case of all the companies running out of people to sell to.

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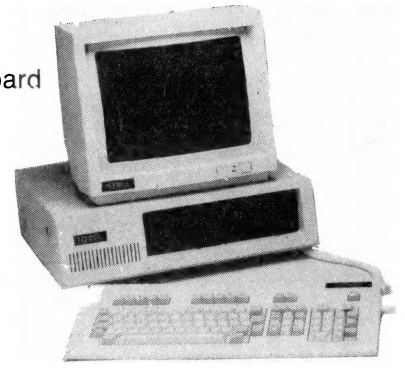

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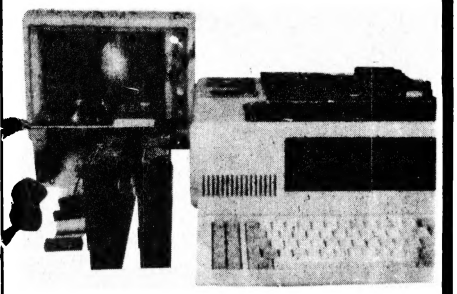

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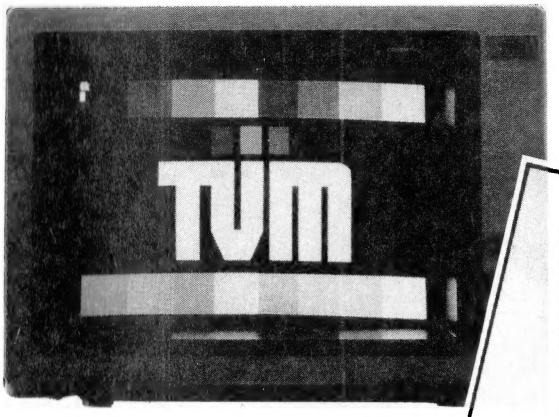

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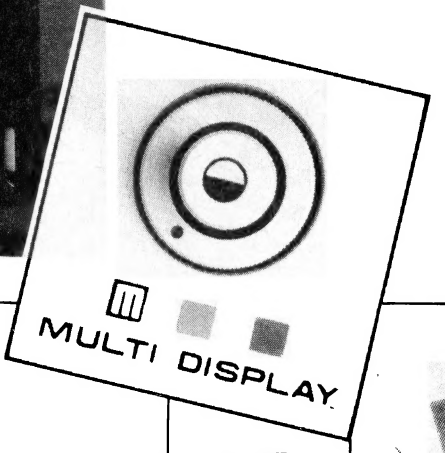

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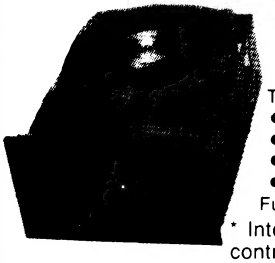

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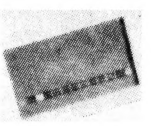

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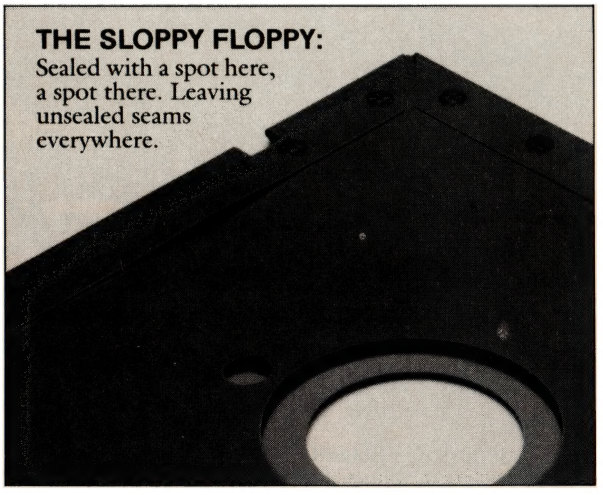

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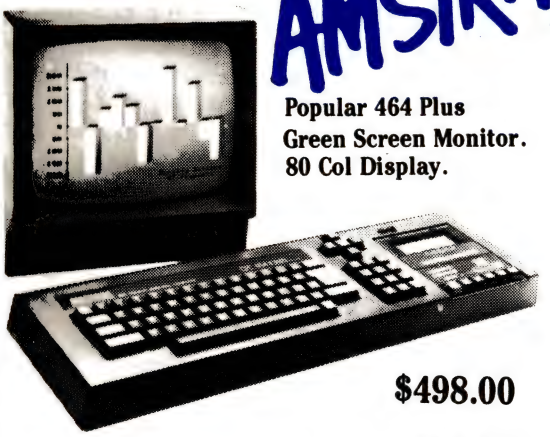

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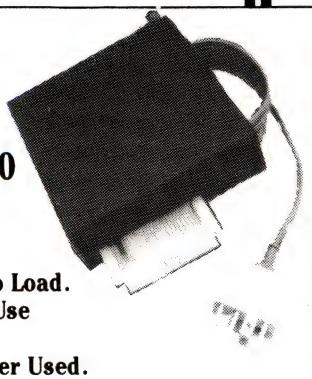

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IBM ANNOUNCES JX

IBM Australia has extended its range of microcomputers by announcing the JX, a low-cost desktop computer. The JX will now be the company's entry-level micro, or as the latest PR jargon terms it, 'personal computing solution'

Brian Finn, Managing Director of IBM Australia, regards the JX as a significant step forward from earlier PC products, combining a smaller, more efficient design with the power to handle business and graphics applications. "The IBM JX was designed with the modern businessperson in mind, but thanks to the wide range of software available for users at any level, it has a place in education and the home as well."

The JX is available in three models. The JX1 is aimed at the classroom crowd, with 64 Kbyte RAM, two cartridge slots, a 30 cm colour display and detachable compact keyboard — for $2115. The 'compact' keyboard comes without a separate numeric keypad; you have to get the 'full' keyboard to get the normal complement of computer keys.

The JX2, suitable for home and small business use, has 128 Kbytes of RAM, full keyboard, colour display, one 9 cm microfloppy drive and a price tag of $2861 — for very small business use indeed, it seems. The top-of-the-line JX3 doubles the RAM of the JX2 and comes with two disk drives for $3365.

Over 100 software packages are already available for the JX, including the IBM Assistant and Displaywrite series. The JX can also run a number of IBM PC programs by adding an optional 10 cm disk drive or by converting the programs to 9 cm format where possible.

The JX is built around the same processor as the PC — the Intel 8088 operating at 4.77 MHz, and the microfloppies have the same storage capacity (360 Kbytes) as standard 13 cm IBM diskettes. Operating systems include DOS 2.10 or power-on BASIC, with interpreted BASIC built into the ROM of all models. The ROM is impressive, using a 1 megabit ROM chip.

It's possible to set up a cluster system of JXs, with an absolute maximum of 64 micros per cluster (although in practice, it's unlikely this number will prove workable). JX clusters can be built around a PC XT or AT as the host computer, with shared printer and files.

At the quoted prices, the JX is certainly not a cheap proposition, but with the restructuring of IBM's prices on the XT (down 7.5 per cent) and the PC (up 10 per cent), the company now has a line of personal computers which ranges from a little over $2000 to around $12,000. The JX3 scrapes in just below the basic PC without monitor, while the top spot is occupied by the 512 Kbyte AT with 20 Mbyte hard disk. □

PIXEL GUIDELINES ESTABLISHED

A new set of guidelines for the operation of screen-based equipment in Victorian State Government offices has decreed the current *de facto* standard for colour monitors (set by IBM) unacceptable and is recommending higher-resolution displays.

The guidelines were drawn up by the Victorian State Transport Authority, the Australian Railways Union and the Australian Transport Officers' Federation. They recommend colour monitor resolution should be similar to that of monochrome monitors, with the minimum standard being set at 600 by 400 pixels (a pixel matrix of 7 by 9 per character).

Industry sources suggest 80 per cent of monitors currently in use would fall below this standard. Among those to be affected is the IBM PC with its 600 by 240 pixel resolution; anyone who has had the misfortune to do extensive word processing work on this machine will welcome the new standard. IBM may have to consider making the 'enhanced' graphics card a standard feature

The guidelines cover other aspects of screen-based equipment, including printers and the design of office furniture and working areas. They are expected to become a standard for both government departments and private firms. □

METLFLOW WINS CAD AWARD

Metlflow, a collaborative project between Moldflow and the CSIRO Division of Manufacturing Technology, has been named the CAD Software Solution of the Year in the 1985 Australian Information Technology Awards.

Metlflow is an advanced computer engineering program used in the design and manufacture of pressure die-cast parts from aluminium, zinc and brass. The tool design engineer, using the capabilities of the software, can graphically draft a design of the runner system for the part, before commencing an analysis of the fluid and heat flow characteristics of that design. The program is also used to determine the size of the casting machine required for the project.

Metlflow is said to provide an integrated link from product concept to production, utilising the full spectrum of computer capabilities from graphic design to mathematical analysis. The system takes much of the guesswork out of a design, thereby enabling a process of optimisation to take place on the design of the runner which feeds the molten metal to the part cavity. □

HP AI

Hewlett-Packard has released its first artificial intelligence software product. Based on the high-level computer language, Common Lisp, the new software is designed specifically for use with the HP 9000 Series 300 family of workstations, and is claimed to greatly increase the productivity of software developers.

The product was announced at the International Joint Conference on Artificial Intelligence in Los Angeles, with HP stating its intention to market integrated AI programming environments of hardware, software, graphics and network products.

Earlier this year, HP announced a $50 million grants programme through which selected US universities would receive HP technical workstations and prototype AI software to help promote creativity in AI research and development. Included in the programme was the recently developed reasoning language, HP Representation Language, which will be released next year.

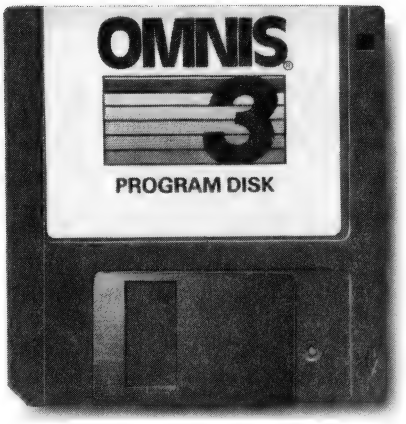
Within Hewlett-Packard Laboratories, more than a dozen expert systems applications have been developed using prototype AI software. One experimental expert system in use at HP Labs allows a computer to 'read' a user's electronic mail messages, sort them according to predetermined criteria and re-route those that should be handled by someone other than the recipient. Other applications, which may become commercial products in the future, include an organic-compound analyser, a photolithography advisor for integrated circuit production, a natural-language database system and a software analyser.

According to HP, a typical high-level Common Lisp development system, including hardware and ▶

Lotus Jazz. Integrated word processing, business graphics, database management, data communications and worksheet.

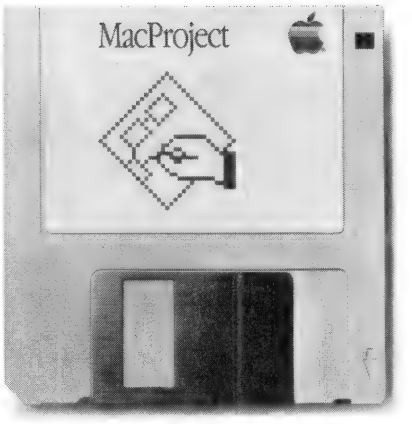
Microsoft Chart. 42 different charts and graphs for presentations, sales reports and transparencies.

MacBusiness. Gain overall financial control of your small business with this integrated, intuitive accounting program.



Omnis 3 by Blyth Software. Single or multi-user data base manager featuring multiple file management and user definable menus.

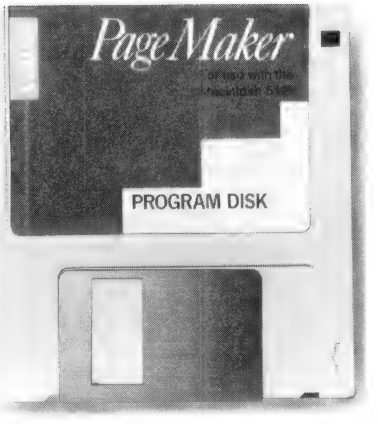
PFS: File. Store and retrieve mailing lists, client records, collections, schedules and inventories.



MacProject. Create complex "critical path" flow charts for production schedules, timelines and managing projects.

ThinkTank 512. An idea processor to organise projects, manage details, outline ideas and support decisions.

Microsoft Multiplan. Electronic spreadsheet for budget forecasting, business planning and "what if" analysis.



PageMaker by Aldus. Design newsletters, brochures, training manuals, presentations and more.

Microsoft Word. Full feature word processor for memos, personalised form letters, reports or any professional document.

Filevision. Visualise market trends, organise and track sales and present data in pictures.

MacVideotex. Access stock market, home banking, travel and other information via Telecom's Viatel videotex service.

WORKAHOLICS REJOICE. NOW YOU CAN DO EVERYBODY'S JOB.

There are now more than 550 software programs available for the Macintosh computer.

Many of them wholly and solely devoted to making your working life more productive.

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Along with programs that no other office computer system can touch.

Like Microsoft Word, Living Videotext's ThinkTank 512, Omnis 3 by Blyth Software and the just-released Jazz from Lotus.

And our own MacProject, which creates sophisticated "critical path" charts that threaten to put common status reports on the endangered species list.

But more impressive than the sheer number of programs for the Macintosh is the sheer ease with which you can use them.

Thanks to Macintosh's windows, icons, pull-down menus and mouse technology, every Macintosh program works the same way. Learn one, and you've learned them all.

Which means not only will you have more time to do your job, but everyone else's job too.

(We said we'd make you more productive, we never said more popular.)

Apple

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AP177 Palace R.A

software, will be priced in the $US50,000 range. AI execution systems running existing AI applications will be priced in the $US20,000 range. The Common Lisp software will be available late this year. □

SA SCHOOLS TEST CAD SYSTEMS

The South Australian Education Department is studying the integration of computer-aided design (CAD) in technical drawing and design courses.

Currently there are three computer-aided design systems operating in Adelaide high schools, each consisting of a NEC APC III with Autocad software, a Summagraphics 1201 digitiser and a Roland DXY800 plotter. The systems were supplied by Amicron Computer Services, the company which last year snared large contracts with SA's TAFE colleges.

The first system was bought in August 1984. Phil Sloper, a computer advisor with the department who was involved in the selection procedure, says the response from teachers in technical drawing could not have been more positive.

"We introduced the equipment in small seminars. Within a couple of hours, teachers with no previous experience of CAD were able to start using the system. It then took another five or six hours' use before they could demonstrate it to their students."

Computer-aided design does for technical drawing and design what word processing does for writing and clerical work — it dramatically reduces dull, repetitive work. Mr Sloper said CAD allows students to concentrate on the more challenging aspects of their courses: "They don't have to redraw a nut or bolt every time it appears in a drawing. Once it has been drawn the first time, it can simply be called up from the computer's memory whenever it is needed."

The first detailed analysis of the CAD project will be carried out in the middle of next year. However, indications are that it has been a success, and the scheme will be expanded. □

AT&T'S MEGACHIP

AT&T has announced it has begun producing a million-bit computer memory chip for inspection and testing by customers. The chip, about one-eighth the size of a postage stamp, can store data equivalent to 100 typewritten pages.

John Nemecek, Executive Vice President of AT&T's Components and Electronics Division, claims that in addition to quadrupling the memory capacity of computers and network switches, the megabit chip will eventually double processing speeds, cut memory cost by a factor of four and shrink desktop computers to briefcase size.

AT&T said its plans were on schedule to begin limited production of the megabit chip before the end of the year and to be in full production early next year. The company said it will use the chip output in AT&T products, including its 5ESS switch, 38 family of computers, PBX systems and personal computers. It will also sell the chip externally.

Bob Lucky, from the company's Communications Sciences Research Division, said the megabit chip "will ultimately make silicon memory significantly cheaper". According to Lucky, the chip will make feasible a whole array of new functions on personal computers. Operations that in the past have required large machines because they are memory-intensive — such as high-resolution graphics, animation and artificial intelligence processing — could be done on desktop machines. □ ▶

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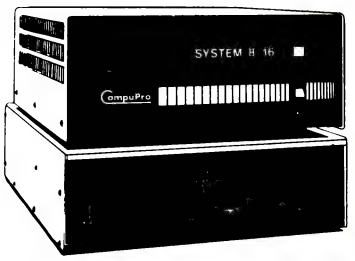

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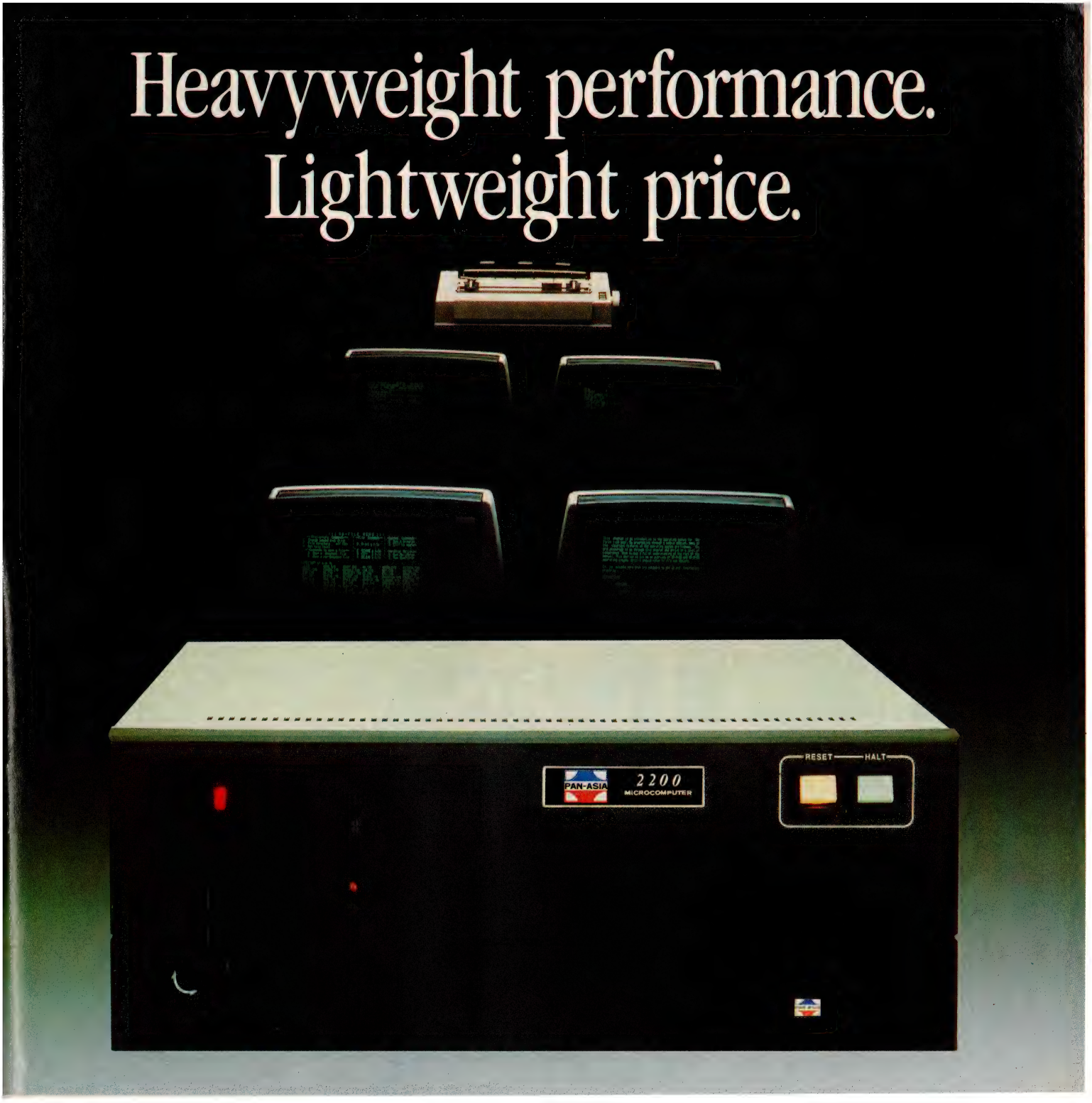

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ACT INFORMATION SERVICE FOR RSI SUFFERERS

An information service for RSI (Repetitive Strain Injury) sufferers has been established in Canberra by the National Occupational Health and Safety Commission and the ACT Health Authority.

The decision to establish the service arose from widespread recognition that positive action is necessary to combat RSI. The centre operates from the Health Promotion Building in Childers Street, Civic, and the ACT RSI Support Group will be housed in the same premises, offering support and counselling.

The establishment of the service is part of the Commission's national preventive and information strategy. □

AWARD FOR INTEGRITY

Integrity Business Software has become the first software developer to win an Australian Industrial Design Council award.

Integrity is a Melbourne-based company which supplies accounting software for personal computers, and won the award for two products, the Ascent Series and Accounting One. Ascent is a series of fully integrated accounting modules for small to medium-sized businesses, while Accounting One marks the company's first venture into software publishing and, according to Integrity, is the first accounting package for small business contained on a single floppy disk.

In presenting the award Dr Peter Claringbold of CSIRONET said, "Design is more important to software than any other area, essentially because just about anyone can write software but not anyone can write well-designed and effective software such as Integrity has done."

Computer software was not eligible for IDC awards until December 1984, when industry lobby groups convinced the Council that software as a manufactured product should be considered for awards; several local software companies have since submitted products for evaluation. IDC recognition is initially awarded for a three-year period and must then be re-evaluated to ensure standards are maintained.

There are up to 400 Design Council selections each year, with 30 or 40 of these recommended for awards. The winners of the Design Council awards are then eligible to be shortlisted for the annual Prince Philip Award for Industrial Design. Products are evaluated by an independent panel of six to eight experts. The panel's citation for Integrity concluded: "Accounting One and Ascent Integrated Software accounting system packages, which are relatively simple to operate and not too complex for the first-time user, are efficient and cater for individual needs at an affordable price." □

FROM LITTLE ACORNS ...

British company Acorn — not famed as a super-computer manufacturer — has developed a 32-bit microprocessor with performance exceeding 3 mips (millions of instructions per second). This is twice the speed of a VAX 11/780 minicomputer and 10 times the speed of the IBM PC/AT.

The new processor uses Reduced Instruction Set Computer architecture (RISC). Prototype RISC chips have been released to a number of major software developers, and the chip is expected to generate major interest from artificial intelligence and high-level language developers.

Software already written for the chip includes a concurrent operating system with a multi-window text editor, BCPL and Modula 2 compilers, BBC BASIC, an assembler and a LISP system. Compilers for C, Pascal and FORTRAN are in the pipeline.

RISC architecture was pioneered by Stanford and Berkeley Universities. The object of the design is to reduce the number and complexity of instructions which the central processing unit has to handle, which is achieved through the provision of more built-in microcode for individual programs. □ ▶

Paper Tamer
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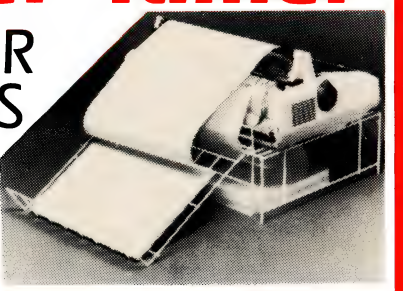

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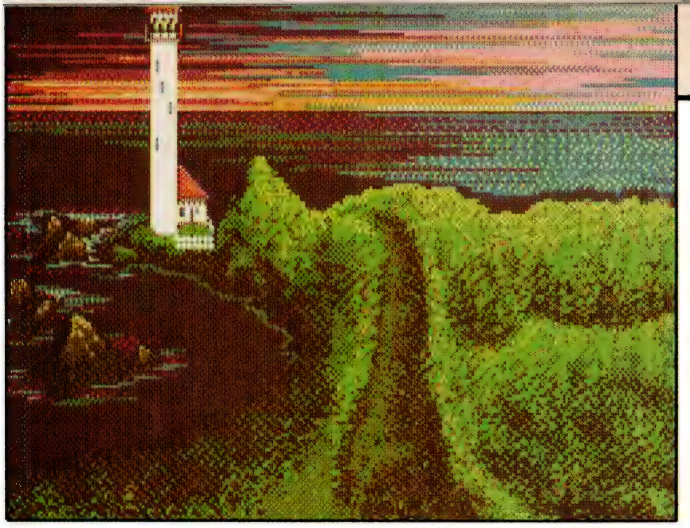
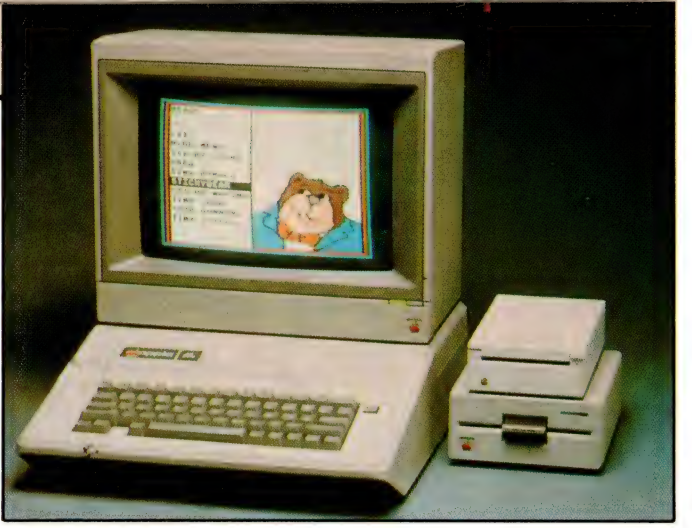




APPLE STANDS BY THE II

OVER THE past year, you could have been forgiven for thinking the only machine Apple produced was the Macintosh. Macintosh software and hardware have dominated product announcements, while analysts have concentrated on the battle of the Macintosh for a share of the IBM-dominated business market.

Now, in a welcome display of loyalty to its old customers, Apple Computer has released a bundle of products which will vastly increase the power and versatility of the Apple II family. The new enhancements include a memory expansion card; a 9 cm microfloppy drive; a colour monitor; and a new printer — the Imagewriter II.

A Megabyte of RAM

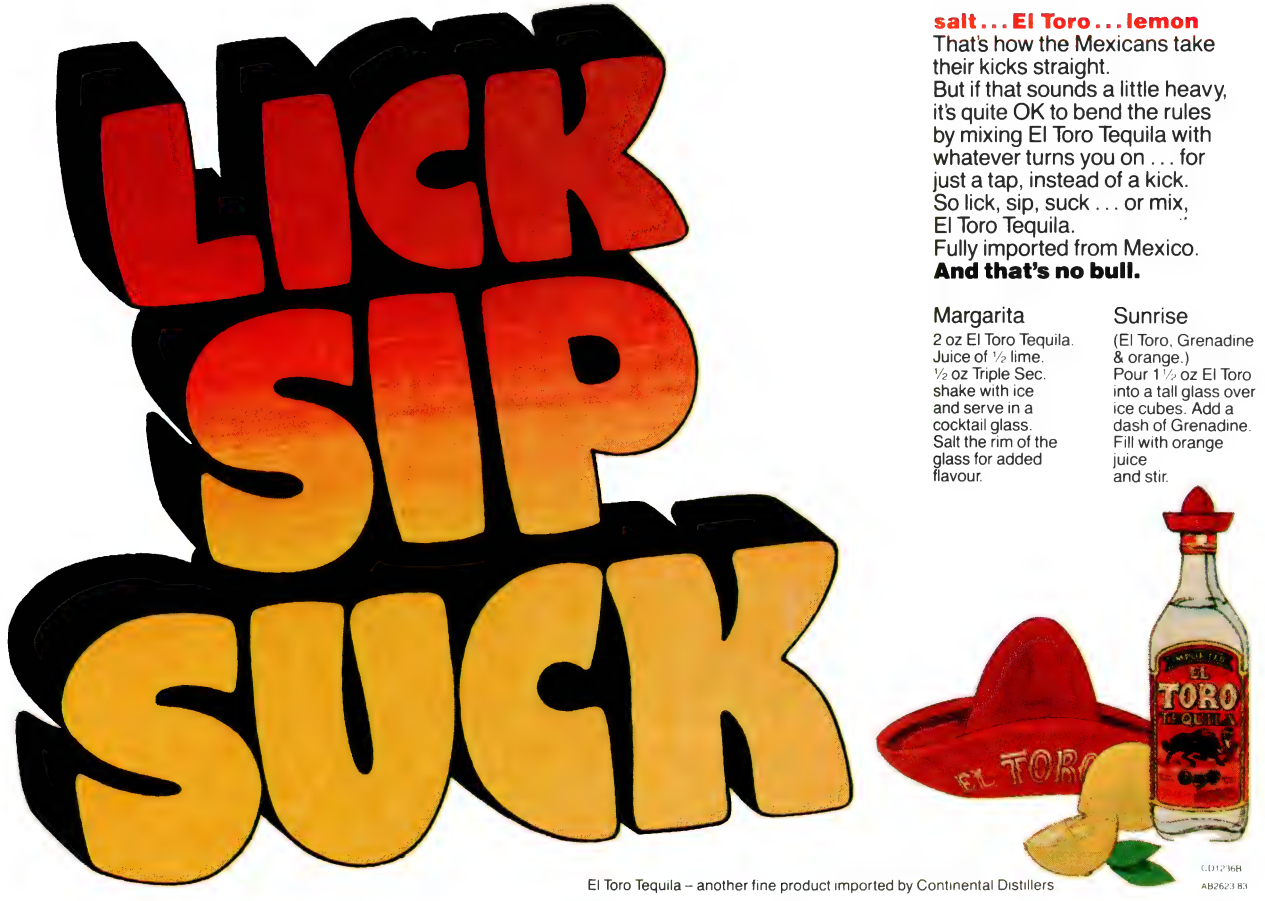
The Memory Expansion Card provides 256 Kbytes of RAM as standard, with expansion to 1 Mbyte in 256 Kbyte increments (256 Kbyte dynamic RAM chips are used on the card). Current software will need to be rewritten to enable programs to access the extra memory for larger files; in the meantime, the extra memory can be used as a RAM disk, providing fast, temporary storage of data and programs.

The new disk drive is called the Unidisk 3.5 (so much for metric measurements). The Unidisk has 800 Kbytes of formatted capacity, which should thrill Apple users who've been messing round with the old 143 Kbyte drives. It costs $695, with an extra $145 needed for the IIe controller card. It will work with the ProDOS and Pascal 1.3 operating systems.

Bundled with the Unidisk is the Mousedesk program selector, which provides a desktop interface similar to the Macintosh Finder — complete with icons and pull-down menus. Unlike the Mac, you can control Mousedesk through either a mouse *or* the keyboard. Also unlike the Mac, Mousedesk drops you into the familiar environment of the currently active program and then returns to the desk image after terminating the program, much the same as GEM.

The Colour Solution

There are two models of the new colour monitor, one for the IIc and one for the IIe; they are identical in all important respects, but styled to suit the respective models. The monitors produce both 80-column text and colour graphics, with colour resolution better than that of a television and monochrome resolution equivalent to Apple's monochrome-only monitors.



The monitors are designed to work with the Imagewriter II. This printer has a top speed of 250 characters per second in draft mode, 180 cps in correspondence mode (for your debtors) and 25 cps in near-letter-quality mode (for your creditors). It can print text and graphics in black plus six other colours. Some software packages increase this spectrum by printing different-coloured dots close together, giving the illusion of many additional colours.

A nifty feature of the Imagewriter is its ability to take a piece of sheet-fed paper while the tractor mechanism is attached; all you do is roll the continuous paper back as far as it will go and feed in the sheet of paper by hand. This eliminates the tedious procedure of changing paper each time you want to print a single letter.

If your sheet-feeding needs are more extensive, an optional sheet-feeder (an extraordinary-looking contraption when in place) is available. It will hold 100 sheets of standard office paper or letterhead.

Built into the new Imagewriter is an expansion slot, which can take another new product — the 32 Kbyte Memory Option. The option provides print buffering, so you can send a file to the printer and then proceed with another task at your terminal while the job is printing. According to Apple, third-party hardware companies are already developing other add-ons for the expansion slot.

Prices for these new goodies are $795 for the colour monitor, $1145 for the Imagewriter II, $395 for the sheet-feeder (which seems very reasonable; many sheet-feeders cost almost as much as the printers they feed), and $175 for the 32 Kbyte memory option. There is also a stand for the IIc monitor, which will cost you $35.

The Big Mac

In all the bustle over the Apple II, the Macintosh hasn't been forgotten. The Fat Mac has put on some more weight and grown a 20 Mbyte hard disk; apart from providing extra storage, the hard disk works two to three times faster than a floppy-only system.

The new disk is an external 9 cm Winchester drive, which sits under the Macintosh and maintains the same footprint. An expansion port allows a second hard disk, an external floppy or a backup tape device to be connected to the system. The disk comes with a hierarchical filing system that manages thousands of files without complex partitioning schemes.

A program called Switcher is provided with the hard disk, which lets you run a number of programs at the one time by partitioning the 512 Kbytes of internal memory. Depending on the size of the programs, up to eight may be used at the same time. Switcher makes the transfer of data between programs a simple operation.

The Imagewriter II will also work with the Macintosh, although the 32 Kbyte Memory Option won't, as the Mac tends to chat to the printer while it's printing a document.

The hard disk costs $3750, while Switcher, provided free with the hard disk, is a public domain program. There is a charge of about $50 for the documentation when buying the program separately.

Apple II Lives

When announcing the new products, an obviously delighted David Strong, Managing Director of Apple Computer Australia, said: "Apple has always had a commitment to the parallel development of the Apple II family and the Macintosh. Over the past year the Macintosh has received most of the coverage, and we couldn't alter that without pre-announcing our products. It will now be seen that the Apple II lives." □

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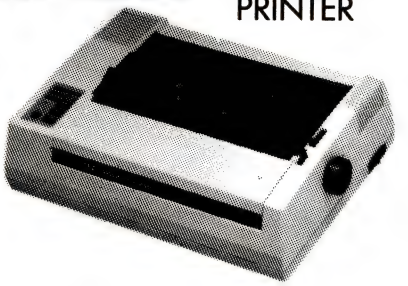
NP2200 NEW DOT MATRIX PRINTER



NP-2200 DOT MATRIX PRINTER from
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AMERICAN GRAFFITI

BY HOWARD KARTEN

Do it Yourself

I owned my IBM PC for 18 months before I got up the courage to remove the cover. When I did, it was only to take a look at the two new half-height drives which I had paid a dealer to install.

Since then, however, I've had the cover off almost more times than I can count. I've added an additional circuit board, inserted a bunch of chips in the board's sockets (which in turn requires resetting all manner of switches inside the machine), and replaced the cooling fan in the power supply. In looking for and installing a replacement battery for my multi-function board, I learned something about distribution channels for electronics and how to find replacement parts for unusual items.

Indeed, I've decided not to replace the bolts in the chassis — they get in the way when you're in a hurry to get the covers off. And as a result of all my do-it-yourself efforts, I've learned some lessons — about economics, self-confidence, electronics — which can benefit any computer owner.

Take the time I replaced the cooling fan. Its odd sounds had begun to remind me of a newly-reformed smoker on a three-mile run; worse, by a particular Friday evening, it needed a gentle push through the housing with a bamboo stick to get started, and even then it was clearly operating under extreme protest. A call to the local dealer's repairwoman elicited some grave concerns — the kind which accompany the news that the whole power supply might require replacement, at a cost of $US200.

As it happened, my in-laws arrived for a weekend visit that evening. I decided that taking a closer look at my sick machine was the ideal way to keep out of trouble.

The closer I looked — hands clasped firmly behind my back, screwdrivers out of reach to avoid the temptation of premature action — the more intrigued I was. It seemed fairly clear that pulling out the power supply was a matter of unplugging about four connectors and removing five or six screws. Finally, temptation got the better of me; before I knew it, I had the power supply in my hand. Sometimes an idea takes hold of you and doesn't let go.

I secured a $10 replacement fan the following day at a surplus electronics dealer, and installed it in 20 minutes. Two of the key lessons I learned from this adventure are: (a) many parts in computers, such as the fan, are industry-standard components whose replacements can be secured from a variety of sources, not just 'authorised dealers' (who tend to charge more for a standard item with a special label); and (b) there are vast numbers of areas where, if you do it yourself, you'll not only save a few dollars but perhaps learn something as well. And it's quite easy.

Hardware repairs, for example, are one area where a confident DIY attitude will pay off. Many *Your Computer* adverts feature parts which require only a modest amount of expertise to install; it's possible to save a significant amount by making up your own cables using DIY parts. (I estimate I've saved an average of $US10 to $US15 — and avoided countless waiting time — on each of the seven cables I've made up so far this way.)

One of the most fruitful areas for experimentation and doing-it-yourself is software. In fact, if done properly, it's goof-proof. There are only three commandments in this area:

1. Thou shalt never experiment on a unique or master copy of software; instead, thou shalt make one or two exact back-ups — and label them carefully — before changing anything.
2. Thou shalt keep a careful record of everything you do, and observe carefully how your changes produce changes in the way the software operates.
3. If thou art a novice, thou shalt make only one change at a time, else thou will not be able to scientifically correlate cause and effect.

I experiment all the time. I'm not a BASIC programmer, but by careful experimentation I've been able to debug and modify some problem software I had. I've optimised the AUTOEXECs used on ▶

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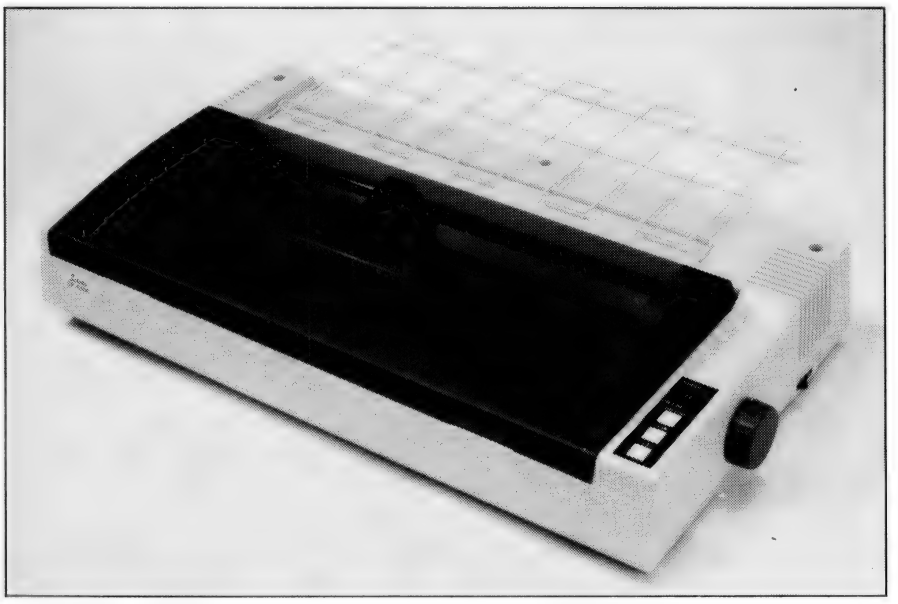

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my disks, been able to deal with all sorts of emergencies, and helped out others with problems. I'm no longer awed by the mystique of the computer; I'm now the master of my hardware and software, rather than vice-versa.

I keep a list of upcoming DIY projects. My next big one is going to be DIY computerised phototypesetting; I've purchased a book showing all the codes required (for example, for type size, type style, column width, and so on), and I'll soon be doing some projects in this area, such as brochures, mock newspaper stories for friends, business presentations, and so on.

Youthful Hackers

In recent years, it's seemed no summer is complete without at least one fantastic tale, well-hyped by police authorities, of youthful hackers (is there any other kind?) attempting to penetrate computer systems. Here's the one for summer (up here, anyway) 1985.

In the state of New Jersey, the prosecutor for Middlesex county arrested seven youths who operated bulletin boards on their computers. Some of the charges were by now almost boring: using the computers to exchange numbers of telephone credit cards (so as to fraudulently bill innocent third parties for calls), and ordering merchandise and fraudulently charging it to the credit card of a legitimate, but innocent, bystander.

The most interesting charges, however, were that: (a) the youths might have attempted to transmit information to satellites operated by AT&T which would cause them to change position; and (b) calling 'coded' phone numbers in the Pentagon.

The youths may well have succeeded in calling those numbers. The numbers in question apparently are part of the Autovon (Automatic Voice Network) telephone system used by the Defense Department to communicate among all its bases and facilities, although whether calling them is a crime is open to question.

Autovon is a separate network, although it's maintained by AT&T and has interfaces with the conventional United States phone network.

Predictably, AT&T denied it would be possible for any outsider to transmit information via phone which could cause any satellite to change position. Although the denials offered by the AT&T folks seem plausible, perhaps even reasonable, stranger things have happened. There are always points of vulnerability in any organisation, no matter how sophisticated; so it is possible, but we'll never know.

The whole affair, however, has the makings of low-grade farce. Most police authorities the world over are notorious technological illiterates and, like fishermen, often seem to enjoy the pleasures of creative exaggeration — particularly as a way of passing the time in the summer heat. Naturally, the press falls for it — not one reporter was able to identify the Defense Department network in question as the Autovon network, and some press reports — even in the same story — seemed unable to decide whether these 'teenage hackers' were in fact computer geniuses of a minor order or merely callow youths who had managed to find a number which worked.

In any case, press-wise, the whole affair clearly originated with some publicity-savvy source within the police. But that was in mid-July; since then, we've heard nary a peep from the police. Perhaps they've lost the telephone numbers of their unwitting press allies.

NCC Roundup

The coming year may be a little quiet in the computer industry, especially compared with the past three or four years. At least, this will be the case if the National Computer Conference is any indication of events to come.

NCC, one of the United States' biggest trade shows, is held in Chicago. Several dimensions of the show provide a clue to the future. Unlike past years, the number of product launches seemed to be at a new low, and many of those launched weren't exactly show-stoppers. The number of parties thrown by vendors was likewise down on previous years and the general feeling, among press and attendees alike, was that the show was dull.

One especially interesting sign, however, was the number of vendors demonstrating optical data storage products of one sort or another. We counted approximately nine vendors showing those products; the coming year is apparently destined to see a considerable amount of activity in this field.

IBM PC2

Several months ago I reported rumours circulating about the alleged PC2, the successor or possibly replacement for the IBM PC. In mid-July, IBM Entry Systems Division president William C Lowe officially scotched those rumours, terming speculation about the imminent announcement of the PC2 "irresponsible". Any such machine would appear no earlier than January 1986, Lowe said. Lowe's statement was unusual for IBM, which rarely responds to such rumours. And market research organisations, which are frequently connected to such rumours, seemed to maintain a discreet silence following Lowe's remarks.

Software Pirates in Apple

Apple Computer is having some problems with software piracy — which is nothing new. This time around, however, there's a slightly new twist: the pirates happen to be Apple employees, who were not only pirating software, but selling it commercially!

It appears that a considerable amount of pirated or illegally copied software was floating around inside Apple; in one case, a software developer is said to have aborted further development efforts when a pre-release version of a product he provided to Apple began showing up on bulletin boards around the country — a situation he attributes to sloppy controls at Apple.

Egg Parades Explained

Since the appearance of my August column, which contained the phrase "...parading their eggs", I have been deluged with phone calls, electronic mail, snail mail, telexes, radiograms, semaphore signals, and several other forms of communications from readers enquiring about the meaning of this phrase.

Actually, this quaint and quintessentially American practice went out of fashion around the time third-generation mainframe computers began to proliferate. In its place, we Americans now occasionally practise parading our *egos*. Apparently, one of those infamous 'transmission errors' caused this error.

Sic Transit [Gloria Mundi] Dept.

How the mighty are fallen: The Apple Computer plant in Cupertino, California, which used to produce keyboards and mice for the Macintosh, Apple IIe and Apple IIc, has been sold to another electronics manufacturing company. However, the new plant owner will still produce some peripherals for Apple ... Mindset Corp of Sunnyvale, California, which in March 1984 introduced an IBM-compatible graphics computer that drew highly favourable reviews, last week filed for protection under Chapter 11 of the US Federal Bankruptcy Act. (Under Chapter 11, corporate debtors are given protection while they seek to reorganise.) Mindset officials attributed their problems to unexpected resistance in attempting to enter the retail computer market ... The latest segment of the US computer industry to be affected by the slowdown is the media. So far this year, an estimated 17 magazines have died, joining the 55 which preceded them last year. The survivors all carry noticeably fewer ads and stories, and many are operating with slimmed-down staffs ... Steve Jobs, the founder and mercurial chief executive officer of Apple Computer, has been removed from the position of chairman of the company. Jobs is reported to have started setting up a new company, which will compete with Apple in the education sector, while remaining chairman of the company he co-founded. He also hired five employees away from Apple to assist in his new venture. □

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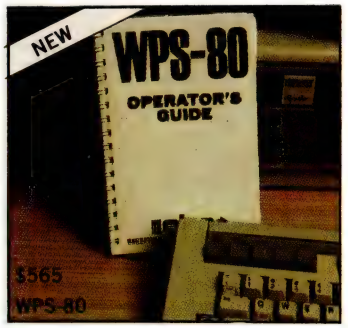

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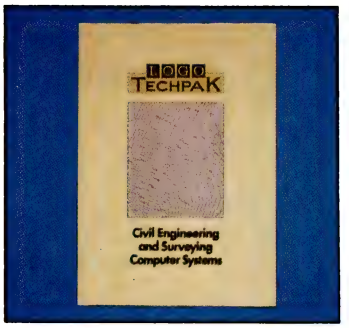

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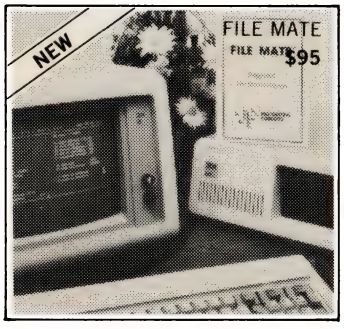

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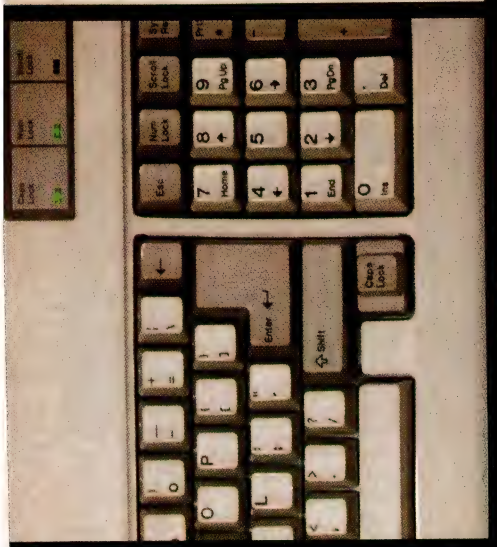
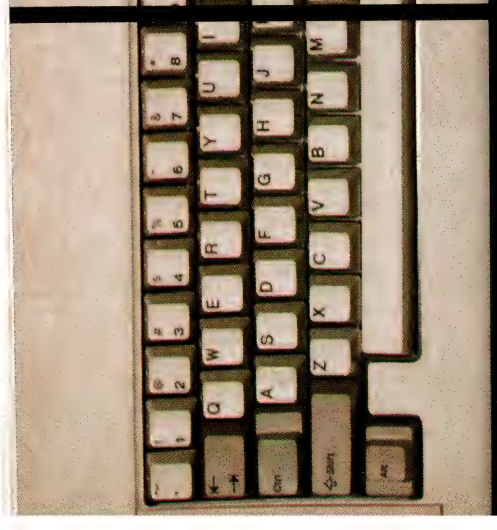
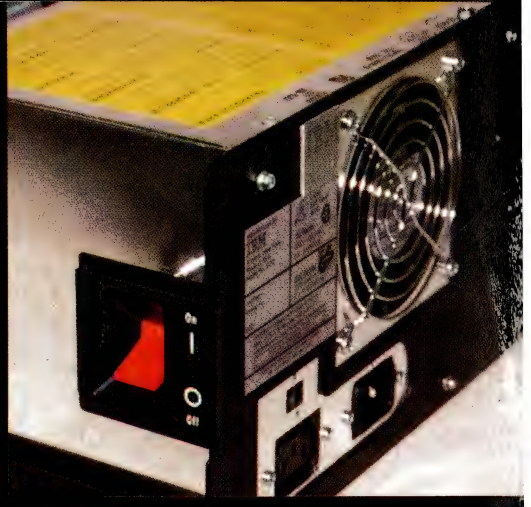
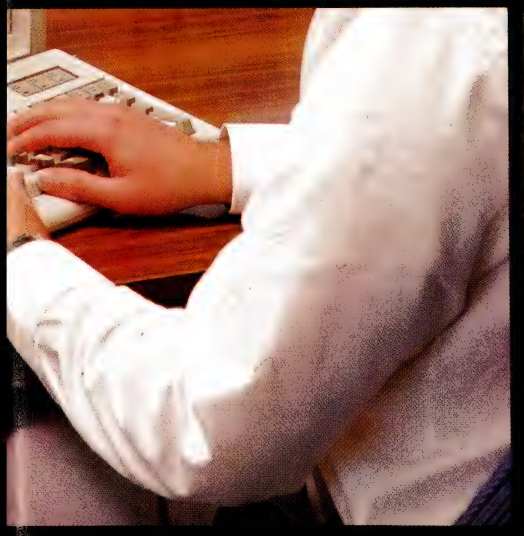


IBM has driven a neat wedge into the micro market with its PC AT. *Go-faster freak* Matt Whelan *looks at the* AT, *its imitators, and the current state of play in the real supermicro market ...*







Computing performance is hotting up so rapidly that traditional concepts of a neatly divided micro-mini-mainframe world are in tatters — and micro manufacturers are upsetting the balance of power more than anyone.

The introduction of the IBM PC/AT, along with the inevitable rash of clones, has split the micro scene into a top-heavy, four-segment market.

While the AT is fully qualified as a supermicro, it doesn't rate as one — whether IBM intended to downgrade the supermicro class (as it did to the micro with its PC) or upgrade the PC class is open to debate, but the result seems to be a whole new category.

So what is a supermicro now? And where does the IBM fit into the scheme of things if it isn't a supermicro?

The New Working Class

Our definition of a supermicro lists the following attributes: large memory space; advanced high-speed 16- or 32-bit processor; memory management and protection hardware; slave processors to perform tasks such as I/O and graphics; multi-user design with external terminals and multitasking operating system; large mass storage devices, often based on the SMD interface; a simplified user interface; and minicomputer-style 'box' construction.

While the AT has most of these, it is seeing service more as a single-user machine; the new-generation desktop, a

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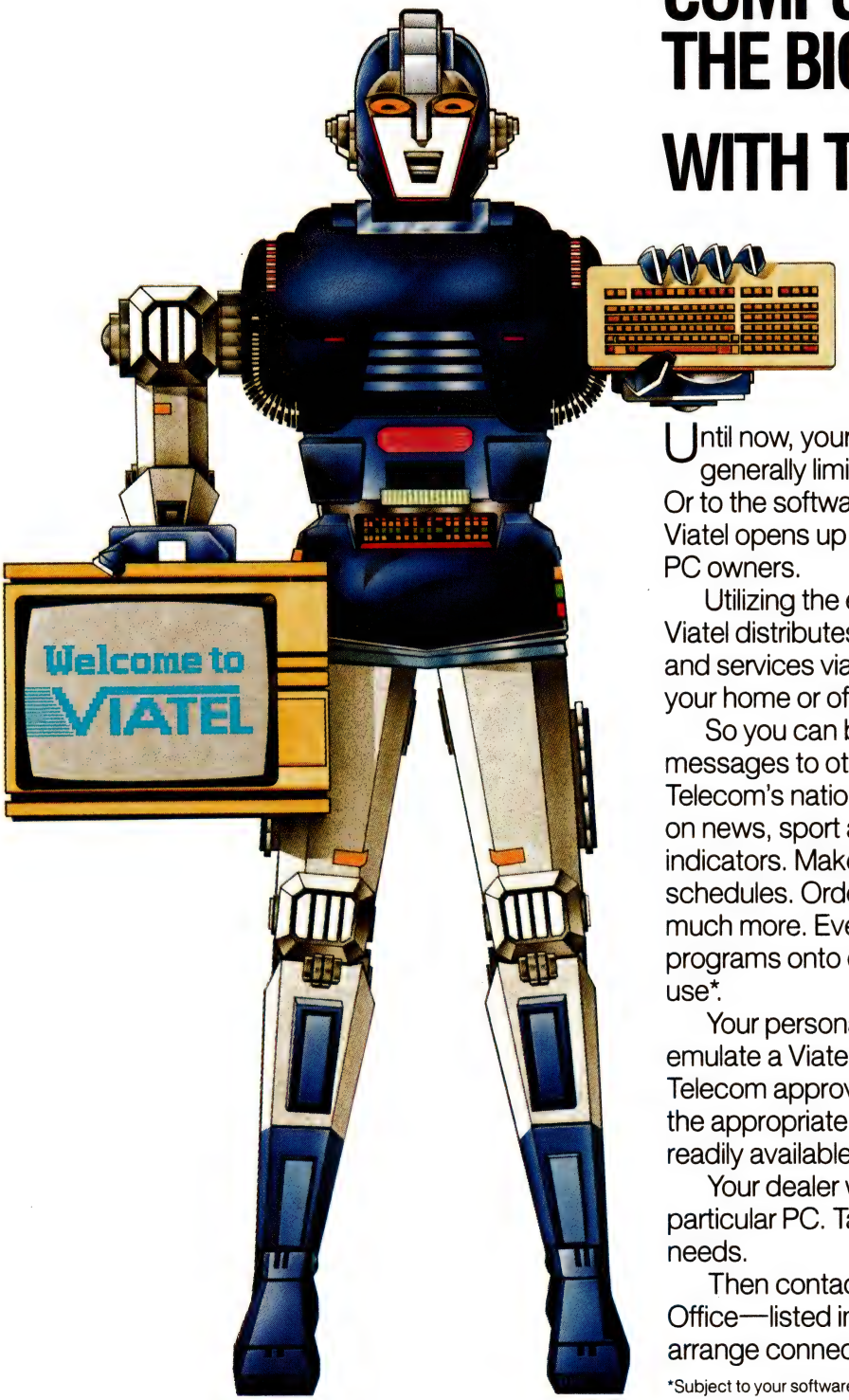

Until now, your personal computer was generally limited to your information input. Or to the software available. Now Telecom Viatel opens up a whole new world for PC owners.

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super-PC rather than a supermicro. It can run multi-user, but probably won't in many installations. More likely it will be best employed as a multi-tasking machine for one 'driver', or as a high-speed server in a PC network.

The coming proliferation of AT work-alikes spells trouble for the makers of 'real' supermicros: IBM dominance will implant this class of machine in the users' minds as the step up from their normal PCs, providing a low-level 'natural' alternative to the more powerful machines which have outclassed minis in many areas.

The superchips behind the supermicros — Motorola's 68000 series and Intel's 80286 (we're still waiting for evidence of National Semiconductor's 32016/32032 in a real machine, despite their obvious promise) — are seeing increasing use at this 'low end'.

So far, most of the supermicro push has been in providing big-machine performance at little-machine prices, either for multi-user operation or for processor- and memory-intensive advanced scientific/engineering applications.

That's changing with this new class being created by companies like IBM, where the super-chip PCs will devote much of their power to user-friendly operating environments: Microsoft's Windows (when *will* we see them?), Digital Research's Concurrent DOS and GEM, IBM's Topview, and so on.

Meanwhile, the real supermicros continue their quest for higher and higher performance — even if outrunning a mini does come at mini-chasing prices of as much as $80,000.

Here's our machine-by-machine rundown on the current state of the supermicro market (except, of course, for the ones the distributors won't tell us about until after we publish, even though we've been asking for the information for months):

IBM PC/AT

We'd best start with the AT, because that's where the mass-market action will be for some time to come. It's both a promise of things to come in the micro market, and an indicator of just how slowly promises can eventuate in this business.

How many times have you read a release announcement and said "Ah! That's what I've been waiting for ... just what I need," only to discover when you place your order that the little extras you need to do your particular job (or even the whole machine) will be here Real Soon Now. You can rush out and buy the machine only to discover a year later that those 'finishing touches' still aren't available. A year is a long time in a fast-moving industry, except when it comes to getting what you were promised.

The AT is a little like that. Full of promises about multi-user operation, large memory capacity, and high speed, it has so far delivered little more than a souped-up PC. Where is multi-user PC-DOS? Concurrent DOS-286? Where are the applications for a three-user AT running Xenix? What *do* you do with your three megabytes of memory if you buy it? The AT's operating system still treats the machine like a PC — the only way you can address memory above 640 Kbytes is as a memory drive.

Be fair, you say? The AT was only released a short time ago, after all ... or was it? In fact, it was on August 14, 1984, three years after the introduction of the first IBM Personal Computer and a long time ago as far as we're concerned.

Enough bitching ... if IBM was perfect in this area it would be the only such saintly computer company in existence. Let's look at the AT's potential.

First and foremost, it's a machine worth having if only for the weight of market support it is getting, as anyone who has been locked out of the IBM PC software market through incompatibility will testify. While full-scale applications which take advantage of the new processor might be slow in coming, you're guaranteed to be flooded with software for your AT faster than you could be with any other machine. And it's software, not fancy hardware, which makes the computer user's world turn.

Whether you buy an AT or a compatible is a personal choice, but remember one thing: the IBM is the only one which can be guaranteed 100 per cent IBM compatible ...

The AT is a fast, well thought-out machine which answers many of the criticisms levelled at the original PC. Itcomes in two flavours: the base model gets one half-height 1.2 Mbyte diskette drive and 256 Kbytes of memory, while the up-market one gets an additional full-height 20 Mbyte fixed disk drive, serial and parallel ports, and a total of 512 Kbytes of memory.

Disk storage can be further extended by adding a second 20 Mbyte fixed disk drive, or a choice of a second 1.2 Mbyte diskette drive or a half-height 320/360 Kbyte diskette drive for full media compatibilitywith the PC.

The base model AT sells for $7821, which seems like a lot for a single-drive 256 Kbyte machine. However, the price looks more reasonable when you compare it to the enhanced model, which costs $11,256. Two I/O ports, 256 Kbytes of add-on memory, and a 20 Mbyte hard disk can be found for less than $3435 in the aftermarket ...

Our benchmark tests on early ATs indicate it outperforms the XT and PC by three to one on memory or calculation-intensive tasks — not enough, by our standards. Current (8 Mhz) 80286 processors should run four to five times faster when used as slot-in 8086 lookalikes, and faster again when used properly (operating systems which do this will be available Real Soon Now, won't they?). Nevertheless, three times is a big jump.

The ImitATors ...

We'll never get this right ... if we know of seven AT clones on sale here, there'll be 14. And another 14 will turn up between our researching and publishing. Regardless of which ones we acknowledge, rest assured that just about everyone has or will soon have an AT lookalike.

Quick-off-the-mark manufacturers include Compaq, Kaypro, NCR, and, locally, President Computers and Perito Holdings.

The Australian-built Perito is a fascinating machine (on paper — we haven't touched one yet) because it takes advantage of the 80286 processor in a way that can be critical to the future of 'IBM compatibility'.

Its makers claim the Perito XT/AT uses "a sophisticated virtual machine emulation approach to resolve the 80286/8088/PC/XT compatibility problem.

"Instruction set incompatibilities between the 8088 and the real mode 80286 are eliminated by a powerful custom-designed processor circuit that monitors 80286 execution and traps any incompatible instructions (so they can be emulated virtually)," the maker says.

This technique allows the machine to 'catch' any badly behaved program (most PC programs are just that, obtaining speed or other benefits by bypassing the operating system) which would fail on a non-IBM compatible, and emulate the standard machine's response to ensure correct operation of the program.

'User mode' programs (application or operating system) which attempt to access the protected ROM BIOS, for example, are trapped and transferred to an emulation routine, which means Perito can provide a 100 per cent compatible BIOS written in a high-level language such as C without fear ▶

of infringing copyright.

The Perito was due to go on sale during October, at $6400 for the floppy-drive version and $8400 for the 20 Mbyte hard disk model. Both prices include sales tax, and the machines come with a megabyte of memory.

President also provides pricing advantages over the expensive enhanced version of the AT. It offers the 20 Mbyte hard disk model of its Taiwanese-built AT for $7900, just $1000 more than the floppy-only machine. Both machines come with 512 Kbytes of memory on board.

NCR has announced its PC8 with the promise that it can run up to 16 users, although it doesn't say how it will do it. The PC8 is an AT lookalike with some advantages: it provides room for three hard disk drives and 4 Mbytes of memory.

The PC8 comes in model configurations almost identical to IBM's, with similar features. It goes on sale in December, so prices have not been announced; they will, according to NCR, be lower than IBM's.

Kaypro has released an AT lookalike which tries to be exactly that — it is very close in specification and performance to the IBM model, although pricing is much better. The base machine is $5185, a two-floppy enhanced version is $7845, and the hard-disk model is $8265.

Compaq's Deskpro 286 is an enhanced enhanced AT — it uses the later 8 Mhz 80286 and provides for extra memory, a bigger (30 Mbyte) disk drive and a tape backup unit within its system enclosure.

The high-speed processor can be slowed down to AT pace either under user control or automatically if the machine discovers an expansion card which doesn't like living in the overtaking lane.

AT Superstorage

The difference in price between the basic AT and the hard disk version is large, and this is also true of some of the compatibles. It may be well worth considering adding your own 'enhancements' to the basic machine rather than ordering the fully specified model.

Just as an example, Micro General has a collection of low-cost and/or high-storage drives to suit the PC, XT and AT — including a 100 Mbyte stunner called the Dart 130. The Dart is blindingly fast, with an 18 millisecond average positioning time and an almost 10 Mbits/second data transfer rate.

You can reach Micro General on (02) 550-2333 if you want to investigate further.

The real supermicros continue their quest for higher and higher performance — even if outrunning a mini does come at mini-chasing prices of as much as $80,000.

IBM PC XT/370 and System/36 PC

A forgotten machine (or never-noticed) in the consumer market, but perhaps even more interesting to many than the AT is the PC XT/370, which offers programmers, engineers, scientists and business professionals the ability to run, unchanged, most Virtual Machine/Conversational Monitor System (VM/CMS) application programs at their desks. The XT/370 operates under a new control program — Virtual Machine/Personal Computer (VM/PC) — providing CMS functions with VM/System Product (VM/SP) compatibility. The IBM Personal Computer XT/370 is actually three workstations in one; it can be used in a standard PC XT mode, as a System/370 VM/CMS workstation, or as an IBM 3277 display terminal connected to a host computer. With usually no more than two keystrokes, users can switch between two preselected modes of operation. Through the use of virtual storage in the VM/PC mode, the XT/370 may be operated as a single System/370 VM/CMS workstation with up to 4 Mbytes of virtual memory. Users can transfer programs and information to their PCs, where they can create and edit files, compile and execute programs and generate reports — and send information back to the host computer. The PC XT/370 can run most application programs unchanged. It can serve as a distributed system for people who need the extensive software library of the 370 series at their desk and the consistent response time that a powerful single-user machine provides. The XT/370 consists of an XT with 256 Kbytes of memory, a display unit, a 360 Kbyte floppy, either a 10 or 20 Mbyte hard disk and new circuitry which provides 370 compatibility. The XT/370 contains microprocessor chips developed jointly with Motorola and Intel, and three circuit cards that give the model its boost in processing power and function. IBM in the United States has also recently announced another 'converged' product, the System/36 PC — a marriage of the PC family to an entry-level System/36 supermicro.

The System/36 PC, which can perform several tasks at once, can support four local workstations including other PCs or System/36 displays. Further remote workstations can be attached.

Mitsui's Esprit DBS16 and X16

Mitsui has announced two machines from Esprit Computer Products which depart from both the AT style and the usual supermicro design.

Based on the 80186 processor, 'little brother' to the 80286, in their basic form they provide for four users, with 512 Kbytes memory and a 19 Mbyte hard disk. The DBS16 is designed to run MP/M-86 or Concurrent DOS, while the X16 is built to run Xenix 3.0.

The DBS16 bus can take up to six extra slave processor boards, each with its own memory and capable of supporting four users, so you can pile a lot of computerists onto it if need be. Hard disk options can take you to more than 100 Mbytes.

The X16 design is similar, although it can have a maximum of eight Xenix users. Prices start at $11,280.

Contact: Mitsui Computer Limited, 1-3 Rodborough Road, Frenchs Forest 2086; (02) 451-7711.

Compupro System 286

The Compupro System 286 is an S-100 (IEEE-696) machine based on the Intel 80286 processor, and housed in a new compact desktop enclosure which includes at least one minifloppy drive, a Winchester and tape backup. Compupro already enjoys an excellent reputation for its dual-processor multi-user systems, five of which are in use at Federal Publishing (publisher of *Your Computer*), where they perform tasks from accounting to producing this magazine; not to mention the Compupro at Les Bell and Associates, where (of course) only the best will do for software development.

The 286 comes with 512 Kbytes of RAM as standard, though most users will want to extend this. Various hard disk options are provided, but the usual choice is the 40 Mbyte Quantum 540.

The operating system supplied with the system is Multi-user Concurrent DOS, which is Concurrent CP/M with MS-DOS

support. The beauty of this system is that it gives immediate access to 'the vast library' (to coin a phrase) of CP/M-86 and MS-DOS software. The systems can be networked with other Compupro systems and IBM PCs using ARCNet hardware, and the operating system provides superb security features, coupled with excellent system maintenance and administration utilities.

The new compact box, which looks like the Compupro 10 enclosure, houses a 12-slot motherboard. For those into heavy expansion Compupro still happily delivers its 'big-iron' traditional enclosures, with 21 slots. The YC system uses one of these, with a megabyte of memory, 13 terminal ports and four printer ports. Average daytime use is six to eight people, which the 80286 handles easily.

Contact: Automation Statham, 47 Birch Street, Bankstown 2200; (02) 709-4144.

Wicat's Big Cats

Wicat produces a range of machines, from the 150 through the 155, 160, 220 and 2220. All are based on the Motorola 68000/68010 processors with varying amounts of memory and mass storage.

The model 150 is a desktop machine with integrated screen and keyboard, and can support from one to six users. Memory starts at 256 Kbytes of RAM and can be expanded up to 1.5 Mbytes, while disk storage is 10 or 15 Mbytes, expandable to 60 Mbytes.

The 155 is a tower package which supports up to 4.5 Mbytes of memory, with up to 12 users and 90 Mbytes of on-line storage, while the 160 extends the mass storage to 1800 Mbytes.

The bigger machines support up to 128 users, 16 Mbytes of memory, and 3800 Mbytes of on-line disk storage.

Wicat is best known for its educational software, WISE, but it is also carving out a niche in the commercial arena. Three operating systems are supported: Wicat's own Multi-Control System (MCS), Unix and Pick, a well-known database-oriented operating system also used by Microdata, Prime and others.

Contact: Wicat Computer of Australia, 77 Pacific Highway, North Sydney 2060; (02) 957 2655.

CT Miniframe and Megaframe

The Convergent Technology MiniFrame is a small tower package based on a 10 MHz 68010 processor and running Convergent's version of UNIX System V — CTIX. A minimum system is supplied with 512 Kbytes of RAM and a 10 Mbyte hard disk.

The Australian-built Perito is a fascinating machine because it takes advantage of the 80286 processor in a way that can be critical to the future of 'IBM compatibility'.

While terminals can be attached through the RS232C ports, CT's terminals utilise an RS422 multi-drop cable, and the increased baud rate gives screen-oriented programs like vi an impression of fantastic speed. The CT terminals also support an option called Window Manager, which allows the user to run four applications in windows with copy and paste integration.

The MegaFrame is a multi-processor-based supermicro claimed to be able to support up to 128 users with a maximum throughput of 8 MIPS.

The system has at least one application processor and one file processor. The file processor always runs CT's own operating system, CTOS, but the application processors can run CTOS or UNIX, or even MS-DOS or CP/M as a sub-task. Other processors handle external cluster controllers and back-end database tasks.

Each cabinet can house from one to three 50 Mbyte SMD drives, and cabinets can be matched up to each other to extend the system bus across up to six cabinets.

Contact: Sigma Data Corporation, 11th floor, 157 Walker Street, North Sydney 2060; (02) 957 3777.

Morrow Tricep

Morrow Designs, manufacturer of the popular Micro Decision range of personal computers, has released its new UNIX-based micro locally. One of these machines takes pride of place alongside yet another Compupro within the YC production chain, at Frontier Technology — the magazine's typesetter.

The Tricep is an S-100 bus based machine which makes use of innovative software rather than new hardware. The machine is based on a 68000 processor (in fact, Morrow is using Compupro's CPU 68 Kbyte board) coupled with a Dual System's DMA I/O board and Morrow hardware for the rest of the system.

The system is supplied with the UniPlus port of UNIX System V, and supports four users. Most interesting is the use of co-processors to expand performance and applications. Three co-processors have been released or are under development: an 80188, 128 Kbyte/512 Kbyte board which runs MS-DOS and CP/M (possibly Concurrent CP/M) applications; a Z-80A board to run CP/M applications; and a 68008 board which will support UNIX applications. In each case, the slave processor operating system runs as a child process under UNIX.

Contact: Automation Statham, 47 Birch Street, Bankstown 2200; (02) 709-4144.

Cromemco X Series

Just on a year ago Cromemco released the machines which took it well out of the shadow of the S-100 'hobbyist' image and into the full light of being a true supermiro manufacturer.

The X Series is based on the Motorola 68010. Two models were released initially, while a third was added this year. The CS-100, which has an 8-slot motherboard with a maximum of 4 Mbytes of memory, and the CS-300, which has 20 slots allowing more expansion, were first. The CS-400 comes with a 140 Mbyte drive, 4 Mbytes of RAM and a 32 Mbyte cartridge drive. It weighs in at around $47,000, but expansion can take this to $80,000.

Memory can range from 512 Kbytes to 16 Mbytes, and the Cromemco is the first machine I've seen which can actually get 16 Mbytes of memory into the cardcage, since it only requires eight of the company's 2048MSU cards, at 2 Mbytes (of error-correcting memory) each, to take it to the limit. Bear in mind that only a few years ago the maximum memory any IBM mainframe could have was 16 Mbytes!

Associated with the Cromemco XPU processor card is the XMM memory management board. This provides demand-paging memory management — with 4 Kbyte pages — and the ability to 'scatter load' a program into multiple non-contiguous pages without first running garbage collection to reclaim the space into a contiguous area. This board also provides the ability to switch context between tasks with a single instruction time.

The disk controller for the X Series has its own Z-80 microprocessor to add intelligence. It boasts a four-track cache memory, and the on-board CPU is capable of ▶

automatically verifying data after it has been written to disk. Similarly, the eight-channel serial board has its own processor for enhanced performance.

A 50 Mbyte hard disk is standard with the 'smaller' systems, and the controller can handle two drives. Further expansion is possible through the SMD controller interface, which can handle up to 1200 Mbytes of disk storage.

The software supplied with the X Series machines consists of two co-resident (on disk) operating systems: CROMIX (Cromemco's proprietary UNIX clone) and UNIX System V (the one true version), ported by UniSoft. Since Cromemco has the full source code for CROMIX, it will continue to support it for applications where UNIX is not suitable, such as real-time process control.

The UniPlus+ UNIX System V is supplied with a range of Berkeley enhancements including *cshell**N, *termcap*, *uucp* and *vi*, the popular full-screen editor.

A number of options are available for the X Series, including a bit-slice co-processor which has down-loadable microcode, allowing optimisation of its instruction set for any application from Fast Fourier Transforms to array manipulation, and which has a throughput of 12 MIPS (Million Instructions Per Second).

Also available for these machines is the SDI II, a high-resolution colour graphics display capable of resolution as high as a television display. Other matching interfaces include a camera input and a variety of other cards.

Contact: Minicomp Software & Hardware, 104-108 Mount Street, North Sydney 2060; (02) 957 6800.

Zilog System 8000

The Zilog System 8000 is based on the Z-8000 16/32-bit, high-speed CPU and is designed specifically for the Unix operating system.

There is a wide range of Zilog models, starting from a $25,000 system which supports eight users, and has 512 Kbytes of memory and a 52 Mbyte hard disk. This is expandable to 672 Mbytes of disk space, support for 40 users and 4 Mbytes of main memory.

Contact: Cadon Computers, 15th floor, 8-20 Napier Street, North Sydney 2060; (02) 920 1381.

Colex Hi-Rise DM/6

A three-user Unix machine which sells for $23,274, the Colex is an attractive floor-mounted computer with up to 2 Mbytes of RAM.

The DM/6 supports Unix System V, PDOS, CP/M-68K and MS-DOS. It is a two-board computer, with an 80186 used to handle all I/O operations. Standard equipment includes a 25 Mbyte hard disk and floppy, plus 1 Mbyte of RAM.

Contact: Colex Australia, 31-33 Hume Street, Crows Nest 2065; (02) 439 8766.

Labtam 3015/V32

Here's one at last! The Labtam 3015/V32 is a 32-bit, floor-mounted unit which uses the National Semiconductor 32032 — the first commercially available, full 32-bit microprocessor incorporating the NS 32081 64-bit double-precision, floating-point mathematics processor and the NS 32082 demand-paged virtual memory management facility.

The Unix System V Operating System features file and record locking for multi-user access, memory management for 16 Mbytes of address space, FORTRAN 77 enhancements and the C programming language, as well as all other standard utilities. The basic 2 Mbytes of RAM is expandable to 12 Mbytes.

Mass storage comes from a 56 Mbyte hard disk, 45 Mbyte streaming tape, and 1.2 Mbyte 20 cm disk drive. Eight RS232 ports and 800 by 600 pixel graphics are also included in the $34,500 before-tax price tag.

Contact: Labtam International, 2 Help Street, Chatswood 2067; (02) 411 2588.

Olivetti/AT&T 3B2

The AT&T 3B2/300 computer is a 32-bit desktop supermicro based on the WE 32000 microprocessor.

Either a 10 Mbyte or 32 Mbyte hard disk is supported, with a 13 cm floppy disk in the main cabinet. As a general rule, the 3B2/300 is designed to support up to eight users. The 3B2/400 is a supermicro which fills a gap between the 3B2/300 and the 3B5 series. Its architecture is based on the 3B2/300, but performance is 40-60 per cent higher with the 10 MHz WE32100 microprocessor.

Two hard disks (up to 74 Mbytes each) are supported internally, together with a 24 Mbyte cartridge tape drive. The 3B2/400 is designed to support up to 20 users. Standard memory is 512 Kbytes.

Contact: Olivetti Australia, 140 William Street, Sydney 2000; (02) 358 2655.

Dual Systems' Systems

The Dual 83/80 is a high-performance microcomputer with 80 Mbytes of storage and support for up to 12 users. Sharing the advanced processor board with the CPU is the Motorola 68451 Memory Management Unit, which allocates memory dynamically according to need.

That takes care of $34,000 ... if you want to spend more than double that, look at the Dual 83/500; in basic form it supports eight users, with optional serial capacity to take that to a maximum of 16 users. Standard memory is 2 Mbytes.

Contact: Dual Systems Australia, 55 Phillip Street, Parramatta 2150; (02) 635 6651.

Visual 2000

A low-cost ($17,000) multi-user system based on the Intel 80286 CPU, the Visual uses Multibus or IBM PC AT expansion. Throughput speed is claimed to equal that of the DEC VAX system (but all us 286 users say that ...).

Standard configuration includes 512 Kbytes RAM, 19 Mbyte disk, 800 Kbyte floppy, six RS232 serial ports, and a parallel port.

Contact: Kenelec (Aust), Suite 8, 54 Alexander Street, Crows Nest 2065; (02) 439 5500.

Fortune 32:16

Fortune's 68000-based 32:16 is a multi-user desktop system, expandable to 13 users, which claims particular advantages in the area of communication with other machines.

Running the company's FOR:PRO version of Unix, it comes with 512 Kbytes RAM, an 800 Kbyte floppy, and a 10, 20 or 30 Mbyte hard disk.

Two models are available: the PS (Professional System) and the XP (Expanded Performance). The starting price is around $10,000 for a single-user system.

Contact: Datacraft Office Systems, 99 Alexander Street, Crows Nest 2065; (02) 438-3688.

IMS' Bus-Plus

IMS International says it has solved the problem of bogged-down supermicros with its Turbodos-based multi-processor system.

It has 'extended' the S100 bus to what it calls S100+ by providing a separate bi-directional parallel bus between its priority-chained slave processor boards.

The result, according to IMS, is a doubling of speed.

Contact: IMS International, 23 Berry Street, North Sydney 2060; (02) 922-3977.

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AD-100A	10M add-on set for Apple II

Expansion Boards

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MBC-CRTA3 monochrome graphics card
MBC-ESCA 512KB multifunction card
MBC-DRAM RAM add-on card
MBC-FLOPPY floppy drive controller
MBC-ESCA + 256 multifunction card
MBI-CGA color graphics card

MBI-MGP	mono-graphics printer card
MBI-MIO	short multi I/O card
MBI-MFC	multifunction card
MBI-MFB	3M byte multifunction board for IBM PC/AT

Monitors

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MTR-CR	14" monitor for IBM 5550
MD-3	13" color monitor

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THE DO-IT-YOURSELF XT

Les Bell, desirous of a cheap upgrade for his PC, decides to go it alone and build an XT.

Being so inexpensive these days, a hard disk is a feasible option for almost everyone. The dedicated hacker will place it high on his or her list of requirements, while corporate and business users will value the convenience and speed the hard disk provides.

However, they're still not that cheap (typically over $1500), and are quite difficult to obtain. There's also the cost of installing the disk in the machine.

You could use an external hard disk, but it has the added cost of a cabinet and power supply. Which way do you go?

I take my PC around the country with me as I travel on seminar tours — in the last six months or so it's been round Australia twice. In such conditions, a hard disk built into the machine would be unlikely to survive the pounding of airport baggage handlers, so for me an external hard disk is the best alternative. I can leave it behind and travel with a floppy-only system.

On the other hand, it would be tremendously convenient to have the hard disk with me when I travel — floppy disk systems are limiting after you've used a hard disk. So I started looking around for an inexpensive internal hard disk — inexpensive enough not to burn too badly financially if it got damaged in transit.

The answer came late one insomnia-ridden night. I was reading *Byte* magazine when I came across an ad for an American supplier who was selling 10 Mbyte hard disks for just $US649, including controller, cables and complete instructions. It was three o'clock in the morning, well into the business day in the United States, and to make things even easier, the supplier accepted payment by American Express.

Plonking myself down by the phone, I dialled Texas and immediately got through to the supplier. Explaining that I was calling from Sydney, Australia, I asked to be put through to their technical staff as I had some questions about hard disks.

First was price: in February *Byte* the disks had been $US649; what were they now? Down to $US549 was the answer. And were they compatible with Concurrent DOS? The fellow at the other end didn't know, but he did know that DOS 2.0 and 3.0 would boot straight off the disk with no modifications, suggesting a high level of compatibility.

"Okay," I said, "let's give it a go," and placed an order for a 10 Mbyte disk to be sent by air.

About a week later a card appeared in our PO box from the customs section at Redfern mail exchange. They had a package for me which was claimed to be a disk valued at $US500. Would I please come and clear it?

Now, that's fair enough as far as packages valued under $250 are concerned, but for anything more than that the documentation is much more complex, so I rang a customs agent and asked him to clear the disk.

If you're bringing goods into the country this way you must be sure the package has an invoice or other documentary evidence of the value of the shipment. If you don't have this you'll have to get it separately by telex or by some other method.

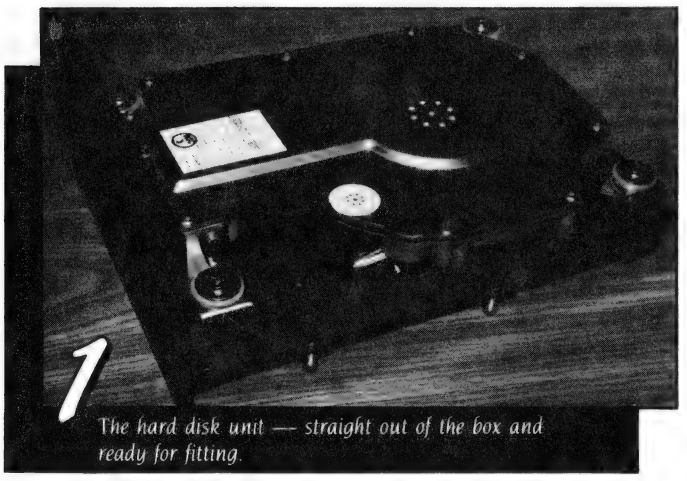
In my case, it took more than a week to clear the disk through customs.

Technical Points

There are a few technical points you ought to be aware of in selecting and installing a hard disk; among these is compatibility with the PC XT. Why is this important? Because nothing in this world is more constant than change.

Currently, DOS 2.0 and later versions support external or non-XT compatible drives through installable device drivers. This has one immediate drawback for some users: such drives work with DOS but will generally not work with other operating systems. Concurrent DOS, for example, comes in a version which will use 'well-behaved' device drivers, but in practice virtually no driver is 'well-behaved'.

Other PC operating systems, such as PC/IX, Venix/86, CP/M-86 and Xenix, either have no provision for device drivers, or use a different device driver which isn't avail-



1 The hard disk unit — straight out of the box and ready for fitting.

2 Remove the screws holding the right-hand floppy drive, disconnect the cables, and slide the floppy out

able from the disk manufacturer. In this case, such operating systems will not work with the hard disk.

You may be thinking, "So what? I only use DOS, so what do I care?". The problem is that future versions of DOS, such as DOS 4.0, will have a multi-tasking capability which places much greater demands upon the device driver code, in the same way as Concurrent DOS does. There's a good chance many existing device drivers won't work with such enhanced versions of DOS.

Given that XT compatibility is important, how can it be achieved? There are four levels at which the disk drive and controller must be compatible:

1. **Drive Interface.** Ideally, the drive and controller should conform to the ST506/412 interface, which most do. This ensures that if you should decide to replace your disk with a larger one later, you need not scrap the controller.

2. **Controller Command Compatibility.** In practice, virtually none of the controller cards on the market are compatible at the command level with the one in the XT. The nearest is the Xebex 1210; Xebex actually manufactures IBM's hard disk controllers and managed to get close to IBM's specs, though not totally compatible. Other controllers, such as those manufactured by Western Digital, DTC and Maynard, have different registers.

While this could seem a difficulty, these controller boards all have a ROM BIOS on board which is compatible with the XT's, and thus are compatible at this level. This does not seem to be a problem for DOS or Concurrent PC-DOS, but Venix/86, Xenix and other operating systems may not work. I'll let you know when I get around to evaluating these products.

3. **Format.** If your hard disk does not conform to the IBM standard format you will require special utilities to format and partition it initially. The only controllers which the IBM Advanced Diagnostics will work on, for example, are the IBM and Xebex ones. Note this is not the same thing as the DOS FORMAT command, which will work fine, since it uses BIOS routines rather than direct commands.

4. **Partitioning.** The XT allows you to partition the disk so up to four different operating system formats may be present on it. For example, my hard disk is partitioned with approximately 30 per cent in CP/M format for use by Concurrent PC-DOS. In general, none of the controller boards mentioned has any difficulty with this; they all run the DOS FDISK program satisfactorily. However, with disks larger than 20 Mbytes or so, the single physical disk has to be split into two logical drives so DOS can cope with it.

An almost ideal setup is a 26 Mbyte drive with 10 Mbytes allocated to DOS and 16 Mbytes to Concurrent DOS, PC/IX, Xenix and/or Venix/86.

Power Supply

The next major problem you may face in upgrading a PC to an XT is power consumption IBM rates its PC power supply at 7 amps on the 5 volt rail and 2 amps on the 12 volt rail. Most PCs which are stuffed with a multi-function card, video adapter, floppy disk controller, mouse or modem board and a hard disk controller are pretty close to the maximum already.

A hard disk doesn't draw much current once it's running, but when it first starts up it draws roughly 4 amps, which will put the PC over its power supply margins. In this case, the power supply will need to be upgraded or replaced.

Many IBM dealers will trade in a PC power supply for one from an XT. An alternative is to upgrade the power supply with a kit from Scientific Electronics in Bayswater, Victoria — phone (03) 762 5777. This consists of a replacement board for the one inside the PC power supply box, not a complete box (which means upgrading the power supply is really a job for a technician with some experience). In addition, IBM has put a special screwhead on one of the screws on the power supply box, and you'll need a special tool to get past it.

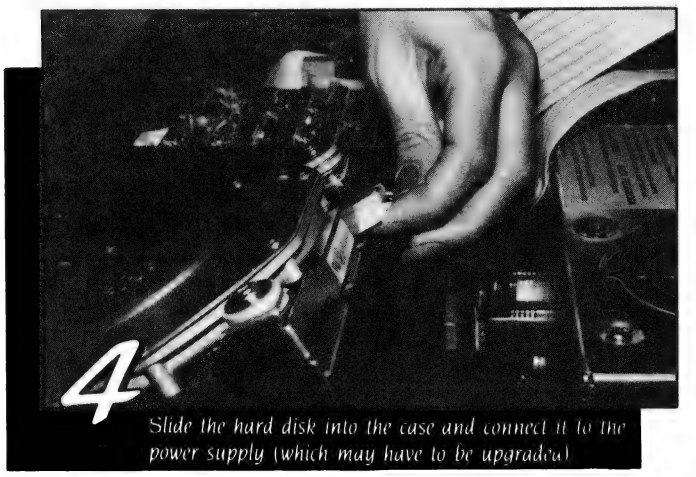
On the other hand, there are now some low-power drives available on the market which can be used to upgrade a PC with no power supply problems. The drive I got, for example, is a Microscience International drive, which works off the PC power supply with no trouble. In fact, I'll swear it runs cooler with the hard disk than it did with two floppies!

If you're planning to upgrade a PC to include two half-height disk drives and possibly a tape backup unit as well as the hard disk, you should replace the power supply.

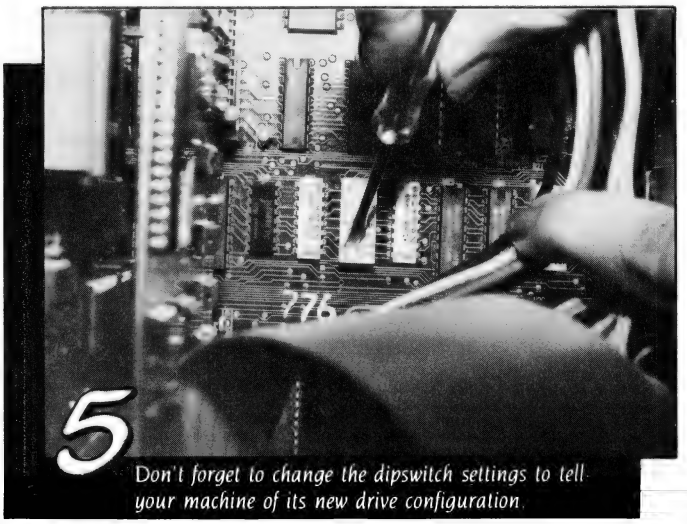
Mounting the Disk

The next problem you may encounter is mounting the hard disk. The standard PC chassis has the mounting holes halfway up the side of the drives, which is where they should go for the standard Tandon TM100-2 full-height floppy drives. However, many hard disks are half-height and will require either a special mounting plate to mount them on the bottom of the mounting tray or spacers and a full-height faceplate to mount them halfway up the enclosure where the mounting holes are. If you're upgrading a compatible such as a Compaq or Taiwanese clone, you may well find the ▶

Ensure the two drive cables are fitted (and orientated correctly), then screw the drive into place.



Slide the hard disk into the case and connect it to the power supply (which may have to be upgraded)



5 Don't forget to change the dipswitch settings to tell your machine of its new drive configuration.

6 Fitting the disk controller ... several brands are available, but few are fully XT-compatible (see text).

mounting holes are elsewhere. Be sure to specify where and in what kind of machine you are mounting it when you order.

The final problem, although rare in Australia, is that some old-model IBM PCs have an old revision of the ROM BIOS. Newer versions automatically scan for the existence of a hard disk BIOS ROM, and if it is present will boot from the hard disk (assuming the attempt to boot from a floppy fails). The old ones don't do this. You can either order a ROM upgrade kit from your dealer or boot from a floppy, which then AUTOEXECs a hard disk boot program (supplied with the controller and drive).

However, upgrading a PC to an XT is generally quite straightforward. Hard disks ▶

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Look Ma, an XT! For a lot less than full price you get the speed and capacity improvements, but miss out on the extra slots.

and controllers are available from a number of sources in Australia, including ACT, Qubie and others. Although I bought mine directly from the United States, I wouldn't recommend it unless you're fairly confident about your own ability to overcome any installation difficulties unassisted, as well as the disk's ability to survive transportation from the United States (they all have to do this, but if you buy locally someone else has assumed that risk).

Incidentally, when you look at the prices in *Byte* don't jump to conclusions — the strength of the American dollar against the Australian means a $US550 disk drive actually costs almost $A850, and then you have to add shipping or postage and local sales tax. Then there's the cost of clearance by a customs agent.

Even buying locally, you can upgrade a PC to an XT for significantly less than the cost of an IBM upgrade or replacement. It's not difficult and it's well worth doing. The only thing the XT has that this upgrade doesn't is three extra slots. Ah well, we can't have everything. . . □

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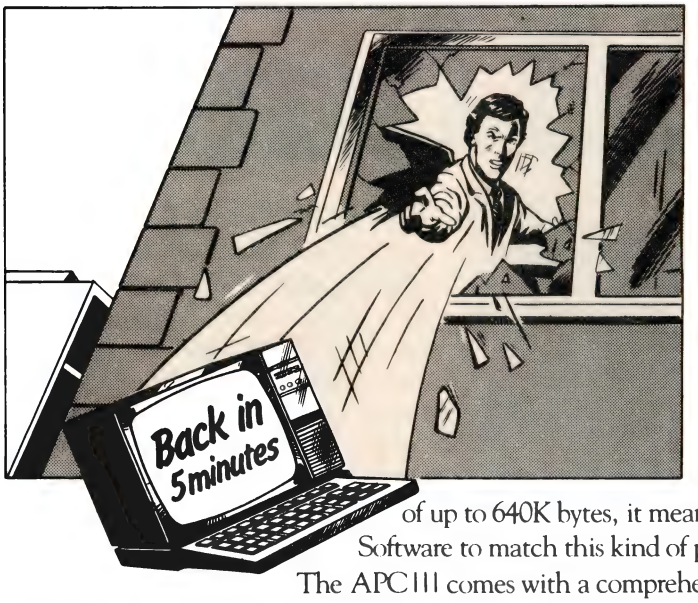

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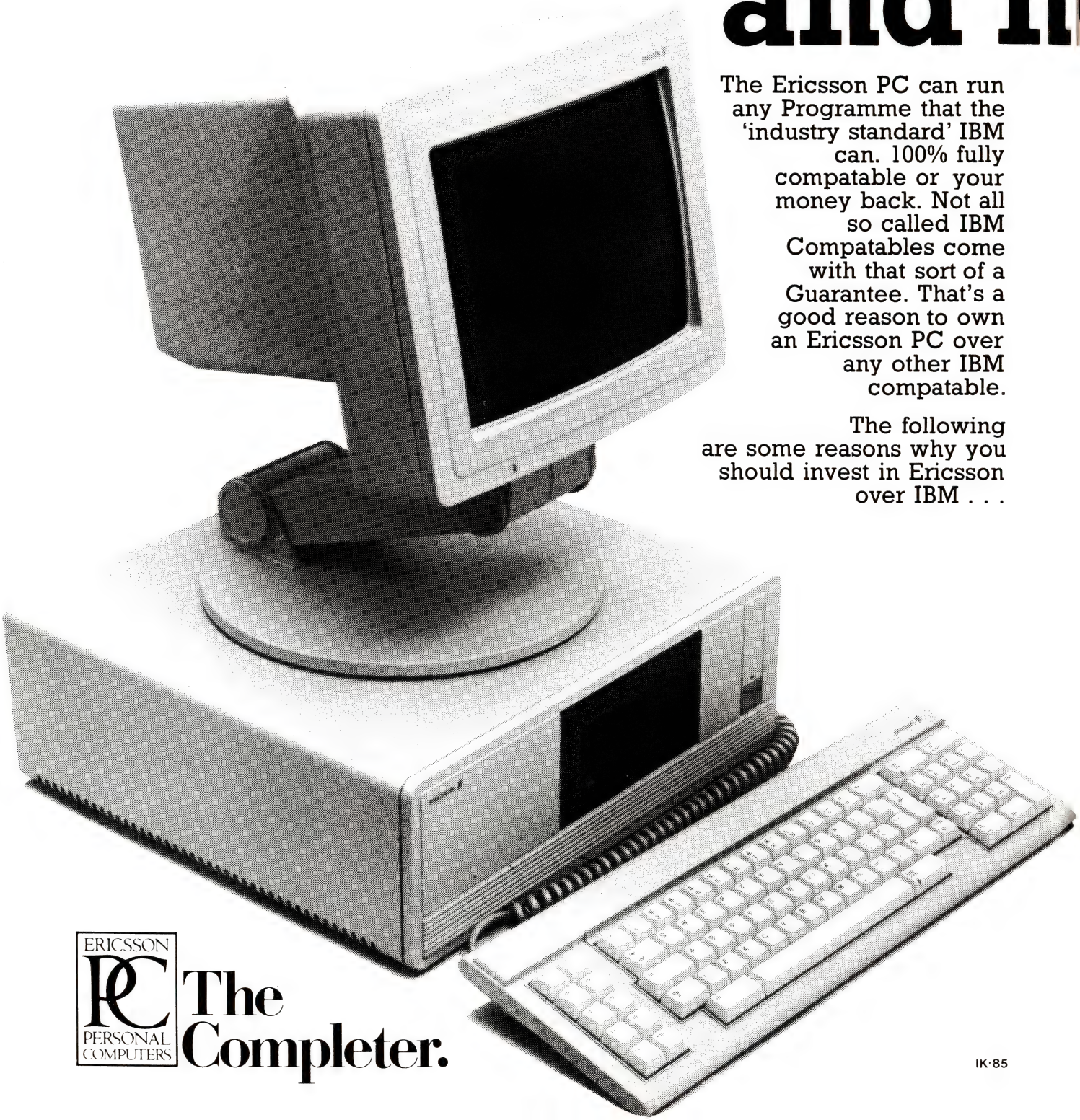

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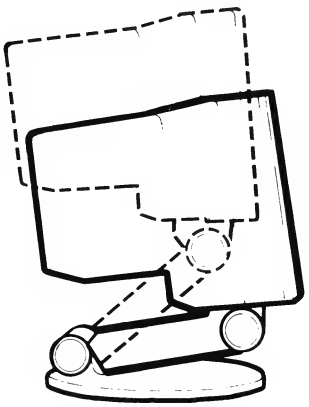
An example of the brilliance in design is the ergonomical arm on the monitor that allows one to adjust it's position to suit the operator. A unique balancing arm that can move your monitor closer or further, higher or lower, more to the left or more to the right. We're all different sizes so Ericsson enables you to decide what's comfortable for you - not the computer.



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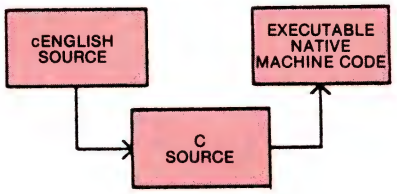
cENGLISH.
The C Generation Language.

What is cENGLISH? cENGLISH is a comprehensive fourth generation procedural language based on dBASE II syntax. It is portable to a wide range of micros and minis. The language features user-transparent interfaces to a wide range of popular C compilers, operating systems, and data base managers.

How is portability achieved? cENGLISH through it's compiler interface translates cENGLISH into documented C source and uses a host C compiler to produce native machine code.



C source can be embedded in cENGLISH source.

Differences in the operating system and data base manager are handled by the runtime libraries.
The result is that cENGLISH source can be compiled without modification on any micro or mini configuration supporting cENGLISH.

What about performance? cENGLISH executes FAST, just like any compiled C program.

How easy is cENGLISH to use? While cENGLISH is a powerful high level language that can accommodate complex software development, it remains simple and straightforward to use.

Call or write for availability of cENGLISH for the following configurations —

Compilers:
Standard O/S compilers: Lattice C™ for MS/DOS™ Operating systems:
UNIX,™UNIX-like, MS/DOS,™ Coherent,™VMS™
Data Base Managers:
C-ISAM™ and INFORMIX,™ UNIFY,™ ORACLE,™ PHACT,™ Logix™

Attention MS/DOS users. Demo version and special introductory offer available for IBM PC, XT, AT, and other MS/DOS systems. eg. NEC APCIII, Olivetti M24. Requirements: 256K, hard disk or two floppy disk drives, and MS/DOS 2.1 or higher.

Also available: the dBASE II to cLINE/cENGLISH Converter to ease the conversion task. Up to 95% of dBASE II code is automatically converted to cLINE/cENGLISH. It requires about the same effort as converting to dBASE III and provides many more benefits.

SAMPLE cENGLISH PROGRAM

```
IDENTIFICATIONS
   MODULE    Mininame
   AUTHOR:   bcs
   DATE:     8/29/84
   REMARKS: Sample cENGLISH program that adds first
            names to a file
END IDENTIFICATIONS


GLOBALS
   FIXED LENGTH 1 ans
   FIXED LENGTH 15 Fname
END GLOBALS


MAIN PROGRAM

   BEGIN
      CLEAR SCREEN
      SET ECHO OFF

      USE "NAMES"
      VIEW BY "ID_FNAME" ASCENDING

      AT 23, 1 SAY "Add a record? Y or N"
      AT 23, 25 ENTER ans USING "!"

      WHILE ans EQ "Y"
         CLEAR GETS
         AT 6, 1 SAY "Enter first name"
         AT 6, 20 GET Fname
         READ SCREEN

         INSERT
            Fname = Fname
         END INSERT


         AT 12, 10 SAY "Welcome to cENGLISH", & Fname
         WAIT
         AT 14, 10 SAY "HIT ANY KEY TO CONTINUE"
         STORE "                " TO Fname
         STORE "   " TO ans
         AT 23, 1 SAY "Add another record? Y or N"
         AT 23, 30 ENTER ans USING "!"
         CLEAR ROW 1 THRU 23

      END WHILE

      AT 12, 10 SAY "That's all for now!"
      UNUSE "NAMES"
      SET ECHO ON

END PROGRAM
```

I'd like to know more about cENGLISH. Please send further information.

Your Name _____
Company _____
Address _____
City _____
Title _____
Telephone _____
Check one: End User ☐ Dealer ☐
System House ☐

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cLINE™ Inc.

CABLE-COUPLING ... TWISTED PAIRS!

Your Computer's *former cable-making specialist* Evan McHugh *set out this guide to 'rolling your own' ...*

"YES SIR, we can make a cable to connect your computer to its printer; no problem. Just bring in your $100 in about a week. Have a nice day..."

Have a nice day? Who is he kidding! A couple of miserable bits of wire and a plug at each end for $100? And it takes a week?

You've just discovered one of the reasons for making your own cables. You'll find another when mum gives you a modem for Christmas and you can't connect it until the shops open again the following week.

Those cables can be pretty important, even without considering the short-term grief their absence may cause you. They are part of one of the great wonders of the computer business — the fact that there are any standards at all in a world where every manufacturer seems to want to do things differently.

We're saved from total incompatibility between computers by a bare handful of standards. Some less standard than others...

The RS232C 'standard' is the cause of most of the heartache. It's probably only a rumour that Clause 1.1.a of the specification reads "Each and every device conforming to the standard must use it sufficiently differently to require the intervention of magic to create a connection" — but most manufacturers seem to have heard it, and taken it seriously.

Our experience seems to support the rumour. We've made hundreds of different RS232 connections; about two of them have worked completely the first time. From computer to computer, to printer, to modem, to terminal, it doesn't matter — whenever we get a new device to connect up, we can lay odds it won't communicate on the first attempt. It will need a custom cable...again.

That's where your cable-making expertise comes in. If you can whip up your own cables — with an eye for the RS232 pitfalls - you can laugh at those high-cost or late-night connection hassles.

Spaghetti Or Ribbon

Us lazy? Of course not, but we'll look at the easiest way of making cables first.

If you know you have a standard connection, the best way to make it is with ribbon cable. No mess, no fuss, no bother — just crimp on the insulation-displacement connectors at each end and go. If only it could always be like that...

It is an expensive way to do it, however. Those connectors cost around $12 each in your local electronics store, more if you're looking at 50-pin Centronics-style connections. And the best way to handle it is to use a special tool to crimp the connectors — the $100-plus investment in the hand version of these means you'd want to be making such cables regularly.

However, you can use an ordinary workshop vice to crimp many of these connec-

Kitted out for cable-making: soldering iron, clamp stand, light-duty screwdriver, sidecutters, and needle-nose pliers.

tors; this technique works well with the Ansley 'Blue Macs' DB25 connectors we use in the office.

To connect one of these you have to watch out for two things. First, you only apply pressure to the centre of the connector, as the clip lugs at the edges can snap off if there isn't enough clearance for them (they stand higher than the connector itself once the back is crimped onto the cable). Second, make sure you orient the cable correctly — pin 1 at one end should, of course, connect with pin 1 at the other. Most ribbon cables are colour-coded to help in this situation.

To put on a connector, slide the 25-wire ribbon between the teeth of the connector lugs and the top cover. Check by eye to ensure wire 1 crosses over lug one, and that the cable is straight. Place it in the vice and slowly clamp it until you hear the two clicks which indicate the cover has engaged the holes in the clip lugs on both sides. Use a sharp blade to trim off excess cable, then fold the cable over and fit the strain relief (these are supplied as standard with some connectors, but must be bought separately with others).

Doing It Tough

Not lucky enough to have a straightforward connection, or can't face connectors in the $10-20 price bracket? Okay, out with the soldering iron!

But first let's think about what sort of connections you might need. There are hundreds of possibilities, some unimaginable or undiscoverable without the help of expensive test equipment or a touch of the magic referred to in 1.1.a. We can only consider a few of the most common here, but for those who want to go further we suggest a little light reading in the form of 'The RS232 Solution', a book by Joe Campbell (published by Sybex) and reviewed in the February 1985 issue of YC.

Clause 1.1.a of the RS232 specification reads "Each and every device conforming to the standard must use it sufficiently differently to require the intervention of magic to create a connection"

In its most basic form, the RS232 interface requires only pins 2, 3 and 7 to be connected for two-way communication — if that suits the devices you're trying to connect (and it often does) the job should be easy. Not too easy, though, because you may still require a crossover in the cable.

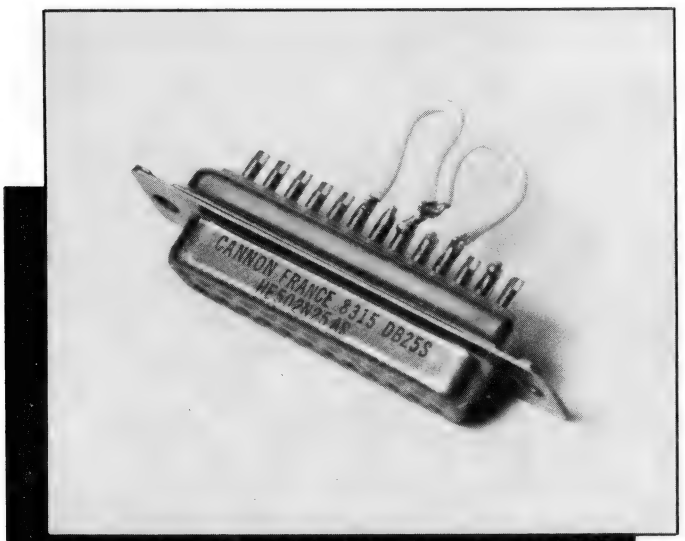
The RS232 standard defines two types of devices, DTE (Data Terminal Equipment) and DCE (Data Communications Equipment). You have to have one of each to run a straight-through cable. DTE devices transmit data on pin 2 and receive it on pin 3, while DCE devices receive on pin 2, transmitting on pin 3. Obviously, if you connect DTE to DTE or DCE to DCE you have a conflict in the pin assignments, so the wiring in your cable has to 'cross', connecting 2 at one end to 3 at the other and vice versa.

This shouldn't be a problem, right? Obviously the manufacturers will set their RS232 interfaces up as the correct device type and everything will work like a dream. Think again; it's more like a nightmare. Different people have different ideas of which categories computers, terminals, printers and modems fall into...if you like adventure games you'll love the RS232 'standard'.

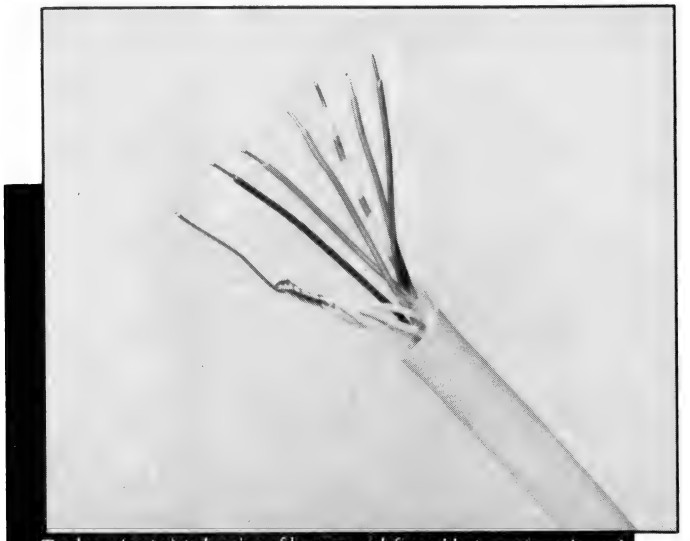
You should be able to determine how your devices are configured by checking the pin assignments in the documentation (making the unwise assumption that the documentation is adequate) and, hopefully, you'll find any special connection requirements in there at the same time.

You will probably discover that at least one of the devices requires further signals. The basic 2, 3 and 7 (transmit data, receive data, and signal ground) cover the transfer of information, but there are several 'status' signals defined to allow 'handshaking' between the devices.

Handshaking is the process of indicating readiness to receive information, and takes one of two forms: software hand-



Status signals can be 'faked' by bridging pins at one end of the cable.



Twelve-wire twisted-pair cable prepared for soldering: the coloured half of each pair trimmed, the joined whites form a common earth

shaking, where (usually) the receiving device sends an XOFF character (control-S) to ask the sender to stop, then an XON character (control-Q) when it is ready to go again; and hardwire handshaking where readiness is 'toggled' by changing the voltage on one of the status lines such as DTR (Data Terminal Ready, pin 20).

Some devices will operate happily without these extra signals, some will refuse to talk at all until certain status signals are 'high' (switched on). And you can't guarantee that the device at the other end of the cable will provide the matching signals, so you will often have to 'manufacture' a signal by cross-strapping wires to existing signals at the same end of the cable. Discovering what signals are needed, and providing them, is where the hard work of cabling comes in.

The *only* sane way to figure this out for yourself is with the aid of a breakout box, which sits in-line with the cable between the devices and shows which lines are high or low and allows cross-strapping of certain lines to experiment with different cable configurations. At $300 or so, a breakout box is a big investment; you wouldn't buy one for a single cabling job. However, if you have to face off against the RS232 interface more than once a year it's worth considering...ours is the most-used and most-valued piece of equipment in the office.

Faking It...

Okay, you don't have a simple cable and you don't have a breakout box — what do you do? The sample cable we're about to make will 'fake' it in many common configurations, although it assumes you do not require hardware handshaking.

When assembling these tools, remember: the materials you'll be working with are small and delicate, so steer away from super-charged soldering irons and bolt-cutting side-cutters.

The most commonly required status signals are RTS/CTS (Request To Send/Clear To Send) on pins 4 and 5, DSR (Data Set Ready) on pin 6, DCD (Data Carrier Detect) on pin 8, and DTR (Data Terminal Ready) on pin 20. We can take care of RTS/CTS by wiring pins 4 and 5 together, and a bridge between 6, 8 and 20 will usually take care of the others.

This is done by simply wiring the pins to each other on the back of the plug so the device provides its own signals, rather than carrying it along the cable in the hope the other device cares about the same signals.

Let's get on with the job of making one cable which will solve several — but far from all — possible connection requirements. When making cables you'll need the following tools:

- soldering iron
- flat screwdriver
- sharp knife or scalpel
- side-cutters
- needle-nosed pliers
- clamp

You may also need some spare wire for connecting pins on the same plug (strapping) and some kind of solder-sucker for cleaning up if you make a mistake. Insulating tape is necessary in some cases, and useful to have around whether you have a specific need or not.

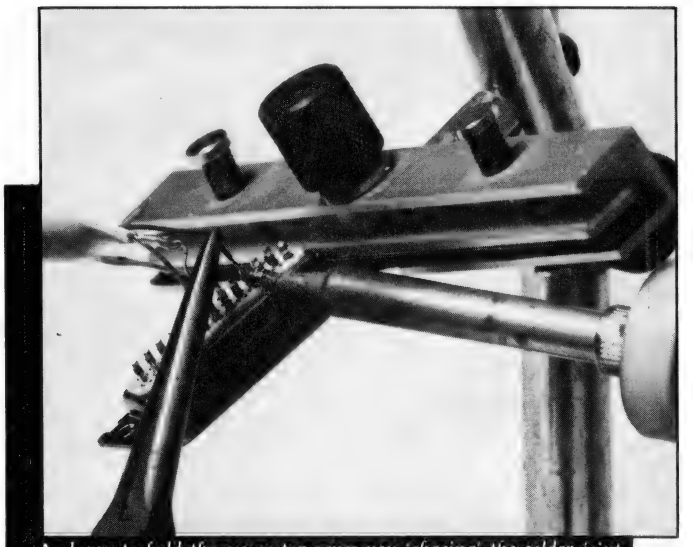
When assembling these tools, remember: the materials you'll be working with are small and delicate, so steer away from super-charged soldering irons and bolt-cutting side-cutters.

The cable will run straight through from pins 2, 3 and 7, with straps on one end between pins 4 and 5 and between pins 6, 8 and 20. Remember, in some situations you will have to swap over the wires to pins 2 and 3 at one end.

Male or Female?

You'll need two DB25 connectors (male or female doesn't matter for our example) with solder lugs. We've used two types of these: on one the solder lug forms a cylin-

Trimming the cable insulation: bend it and snip at the edges with your sidecutters, then bend it the other way and repeat.



A clamp to hold the connector saves you 'chasing' the solder joint across your tabletop; pliers to hold the wire save your fingertips.

der into which you solder the wire, while on the other the lug is only a groove. The second type are awful to use, as the flimsy lugs bend, break, and can short out against each other. In fact, they're so bad, we threw away our entire stock in disgust.

What sort of cable should you use? There are many different opinions on the benefits of expensive, shielded data cable, normal shielded cable, twisted pair cable, and so on. We've tried a few and settled on 12-wire twisted-pair telephone cable for most applications. This cable has six pairs of wires, each pair being one coloured and one white wire, twisted around each other. We use 6 wires for signals (when we need that many), with the other 6 (one from each pair) running to signal ground. This configuration has served us happily for runs of 100 metres, which is well over the RS232 specification.

In our example we only need two signal wires using, say, red for pin 2, green for pin 3 and running the whites to pin 7. Often you can run just one white to pin 7; it's harder to run several, but sometimes you must, so we'll do it that way. (We use the multiple earths for longer runs; it's unnecessary for short cables).

Now for the cable.

Take one of the DB25s and lightly clamp it into a position where you can work on it, keeping the solder lugs exposed and accessible. If you position the long row of lugs above the short row, pin 1 will be on the top right for a male connector and the top left for a female connector. Most connectors will have the numbers written near the lugs.

All you do is pour solder on pins 4 and 5 until there is enough to solder the two together. Is that crude? Is that nasty? Yes. But it works!

The solder lugs which are going to have wires connected to them should be filled with solder. The reason for this will become clear shortly. What about the straps? There are two ways to do straps, depending on their position. The first can be used for lugs which are next to each other, such as lugs 4 and 5. All you do is pour solder on pins 4 and 5 until there is enough to join the two together. Is that crude? Is that nasty? Yes. But it works!

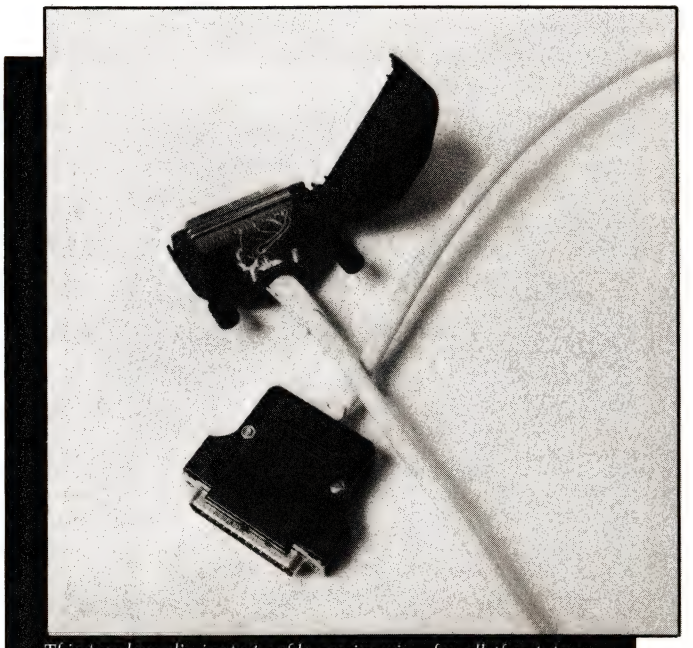
Having prepared all the solder points you have to prepare the wires. To remove the outer cover of the cable bend it double, about an inch from the end, and cut across at the bend. To remove the cover completely turn it over and repeat the process. Don't cut too deeply or you'll cut some wires. Draw off the end of the cover to reveal the insulated wires inside. Don't throw away that end, it may be useful later as shim for the strain relief of the connector cover.

Now you can see the various coloured wires and decide which colours to use for which pins. Write these down on the same piece of paper as your cable specification, if possible on the lines between the pins.

Squeeze!

You'll have to remove some of the insulation from the wires. There's a tool which does this quite nicely, but it costs money and, if you're careful, the job can be done with the side-cutters (or your teeth!). Use the side-cutters to grip the insulation and squeeze until you're almost down to the wire inside. Then, without squeezing any tighter, pull towards the end of the wire. The insulation should pull away, revealing the bare wire inside. The holes in the solder lugs on your DB25 are about 3 mm deep, so trim the exposed wire back to 3 mm. Doing this will leave you with very neat connections to the solder lugs, with insulated wire above the top of the lug and exposed wire buried safely within the sol-

These hand tools which allow instant connection of crimp-on connectors to ribbon cable cost upwards of $100.



This 'modem eliminator' cable carries wires for all the status lines we're likely to use, but swaps pins 2 and 3.

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In fact, any financial information on just about any aspect of your business.

MAGNABIZ uses no accountancy jargon — it takes the brains out of the accountant and puts them into the computer.

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"There has been a gap in the accounting software market between simple cashbook programs and complex, full-blown accounting systems. There's been nothing for the person operating a small business, who just wants to keep the books up to date and in order without getting into complicated calculations. **MAGNABIZ** fills that gap very creditably." Judging Panel, Australian Software of the Year Awards.

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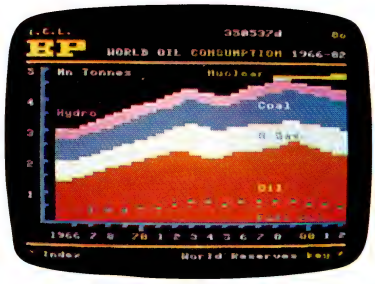
(MAGNABIZ SYSTEMS is a wholly owned subsidiary of Ilehead Pty. Ltd., P.O. Box 510, Chatswood, N.S.W. 2067)

A PC85 Another Great offer from microbee

The Personal Communicator

The PC85 is the personal communicator. User friendly, it's packed with innovative features like one touch selection; that enables you to choose from a menu of built-in programs. Word Processing, Basic, a Calculator, Telecommunications and more. These commonly used programs, plus three bonus business programs, are all inclusive in this offer from Microbee.



PC85 with Viatel as standard

The exciting news is that Viatel, the Telecom Service which enables you to convert your Microbee into a Videotext terminal, will come as standard with the PC85. Viatel is the easy-to-use, low cost information system. By connecting to the existing telephone network, with the easy to use Telecom approved 1200/75 BAUD Beemodem your Microbee can provide news, weather, telebanking, information, even games. And if you're playing the money or stockmarket, Microbee with the Viatel option is the perfect technology tool to keep you informed and in front.

PC85 with Spreadsheet, Database and Graphics

The personal communicator now offers more with packaged software that includes spreadsheet, database, and simple business graphics. Apart from the built-in software, you'll be impressed with the increased versatility offered by the PC85. **— The Personal Communicator.**

Look at the simplicity when it comes to selection of programs:— The first letter of the name of the program is all that's required, you type it in and immediately access the appropriate choice on the menu.

New Release

The all important business trio spreadsheet, database and business graphics are now on board in your new Microbee.
Spreadsheet: the electronic ledger for small business and beginners.
Database: an easy to use computer filing system puts all your records (files or address book) in order and keeps them in order while you add more files and retrieve information at will.
Business Graphics: illustrates financial reporting, growth, profit and loss, produce bar charts (Histograms) and line graphs to illustrate the state of the budget or the growth of your pet dog. With this easy to use business graphics package all you do is enter the figures — the Microbee does the rest.

NI-CAD Battery Back-up

Microbee's nickel cadmium battery back-up means you don't lose your data if the power goes down or when you switch off your system for the night.

Offer Number 1

PC85, The Personal Communicator with built-in software and Monitor:—

PC85	$499.00
Monitor	149.50
Viatel Option	49.50
	$698.00
You save	99.00
You pay only	$599.00

PLUS you get Spreadsheet, Database and Graphics at no extra cost.

Offer Number 2

'The Complete Communicator Package'

If you take offer No. 1, the PC85 and Monitor, add Viatel compatible Bee Modem priced at $189.50, together with a Dot Matrix Printer for $399.00, and you have the lot, the complete package for under $1,200.

Check the exercise again:—

PC85 with Monitor	$599.00
DP100 Dot Matrix Printer	399.00
Bee Modem	189.50
Printer Paper	7.50
	$1195.00

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Stones Corner, Qld. 4120
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Victoria
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Deepdene, Vic. 3103
Phone (03) 817 1371

South Australia
117-119 Gouger Street,
Adelaide, S.A. 5000
Phone (08) 212 3299

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141 Stirling Highway,
Nedlands, W.A. 6009
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VIATEL STANDARD

Take the Lot, You'd Bee Mad if You Didn't

Programs supplied with PC85 as standard:—

- MicroWorld BASIC
- Help ROM for help on BASIC STATEMENTS
- Wordbee — Word Processor
- Telcom — Communications Software
- Self Test Program
- Calculator
- Machine Code Monitor
- 24 hour Clock with Alarm

ART PROM 2758

der. If you're connecting more than one white to pin 7 don't trim the wires back. I'll explain what to do with them shortly.

You should silver the wires with solder. If you have multi-strand wires, do this before trimming them. First, twist the strands together and then hold the soldering iron and solder on them. When the strands heat up, the solder will flow along them, fusing them together. You'll then be able to trim the wire as you would a single core wire.

Now you're ready to solder the wire to the solder lug. Position the wire just above the solder lug and heat the solder until it melts. Then, plunge the wire into the solder before removing the soldering iron. If you've prepared the wire properly it should go all the way down to the insulation. Hold the wire into the hole until the solder has set. Do this with all the other wires — in this example, just one.

To connect the whites twist all the bare wires together and trim approximately 3 mm from all but one. Solder them in the same way you silvered the multi-strand wire. Take a piece of insulating tape and lay it lengthwise along the wires and then fold it over them, taking care to leave the end of the longest wire exposed. Lay the wires on a table and, using the knife or scalpel, trim back the excess insulating tape. Now you can connect the whites just like the other wires. Be careful with the soldered whites because they're brittle and can snap if excessively strained.

The only connection left is the pin 6, 8 and 20 strap. To do this you can use either a bare piece of wire or an insulated piece, with the insulation stripped in the middle and at both ends. Insulated wire-wrap wire is excellent for the job. Fashion the strap into a multi-pin wire, using a pair of needle-nosed pliers. The idea is to make a wire which will come up from solder lug 6, bend at right angles and head towards solder lug 20. It then goes down into lug 20, U-turns and comes back out, where it does another right-angle bend and heads for pin 8. It descends into pin 8 and stops.

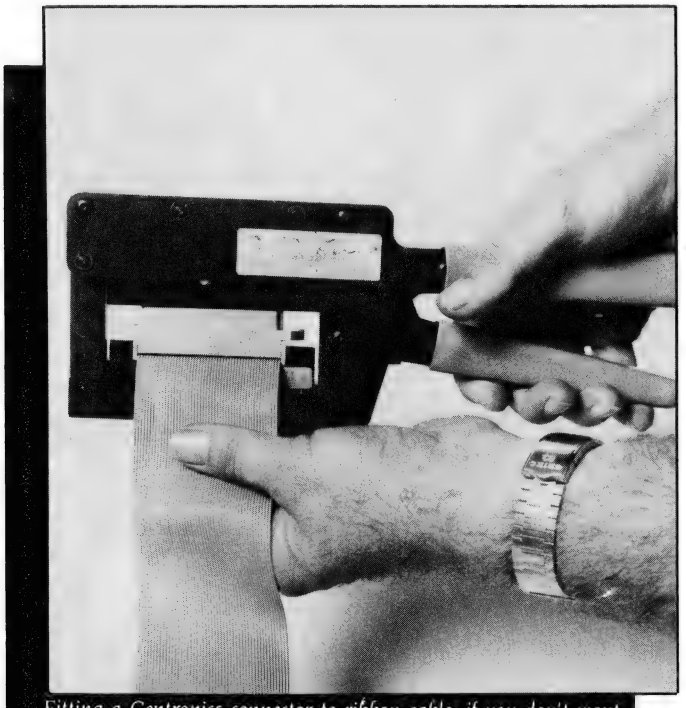
To make this wire use the pliers to put in all the bends and crimp the wire for the U-turn. When you've done this you'll need to put a kink in the wire so it can head towards pin 8 after going to pin 20. When the wire is ready, solder it into lug 20 first then solder the two ends in place.

You have now completed the connection and are ready to put the case on. Don't. Experience has taught us that the likelihood of the cable not working increases if you carefully fit the plug covers and finish it all off. Test it first, then fit the strain reliefs and covers.

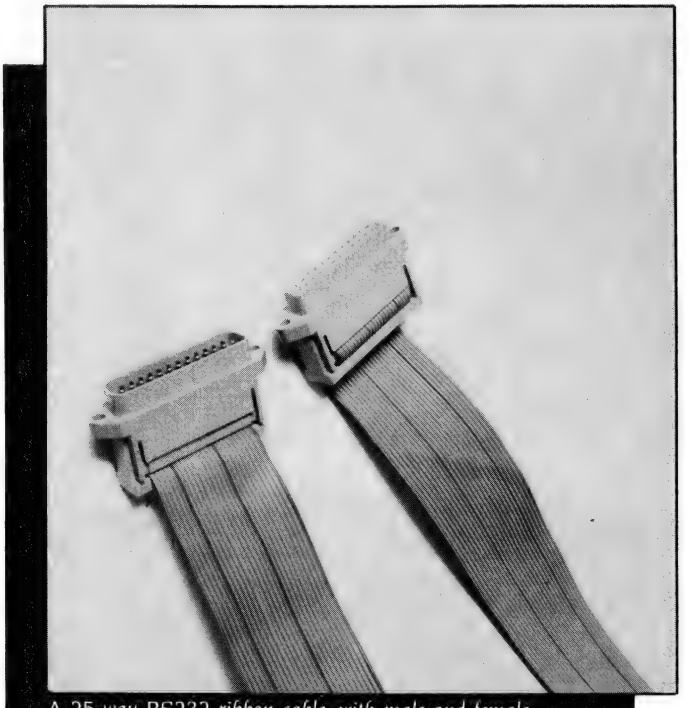
The other end of the cable is simply more of the same, except you'll have to take careful note of which wire goes where. And, as each end of this cable has different pin connections, you should mark them as being computer or peripheral. A diskette write-protect (or enable) sticker with a C, P or other code written can be stuck on the connector cover to look after this.

If it doesn't work, your first assumption will usually be that pins 2 and 3 need to be swapped at one end. Because this is so often the case, it's worth making up a separate cable which does exactly that so it can be used for testing (a much simpler solution than removing and resoldering pins on your main cable). The test cable should have straight-through connections on all major pins so that any signals used on the main cable will be carried through. If you don't have a breakout box, a 'modem eliminator' test cable is mandatory.

The RS232 standard is non-standard enough to be able to cause you endless frustration, but the important thing is to realise that it's worth 'having a go'. Making a cable isn't hard - if it works, you're well ahead in time, money and a sense of achievement; if it doesn't it was a brief, inexpensive, educational experience. □



Fitting a Centronics connector to ribbon cable: if you don't want to buy the tool, a workshop vice will do the trick.



A 25-way RS232 ribbon cable, with male and female connectors — be sure pin 1 connects to pin 1.

INTRODUCING THE WORLD'S FIRST DUAL HEADED PRINTER

Now Brother gives you two machines for the price of one.

Daisy Wheel or Dot Matrix, the choice is yours in the revolutionary new Twinwriter 5.

For $1995.00 it will deliver 36 cps letter quality daisy wheel print, and 140 cps dot matrix type and graphics — more efficiently and much more economically than any other two machines you can name. The Twinwriter can put you around $1000 in front, save you valuable time and will only take up half the space.

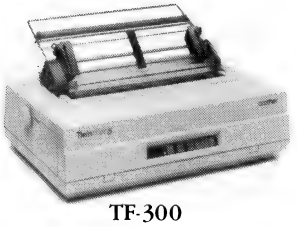
Brother's breakthrough dual printhead technology means you can now produce daisy wheel quality copy and dot matrix graphics in the same document. At the push of a button — or through software driven commands.

Other features include:

- 3K byte buffer (optional 11K or 19K byte)
- 136 columns
- 420 cms (16.5 inches) paper width
- Centronics Interface with optional RS-232C converter
- Interchangeable daisy wheel cassettes.

Plus a range of cost efficient options.

This highly versatile printer can be made even more efficient but with the addition of a cut-sheet or tractor feeder. Brother are recognised as the experts in printer productivity and we know you'll soon recognise the cost benefits of these invaluable accessories.



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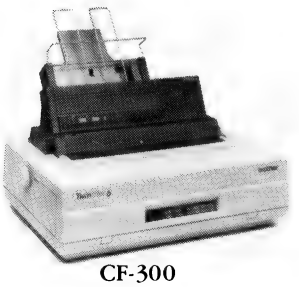
$189 r.r.p.



CF-300
CUT-SHEET FEEDER
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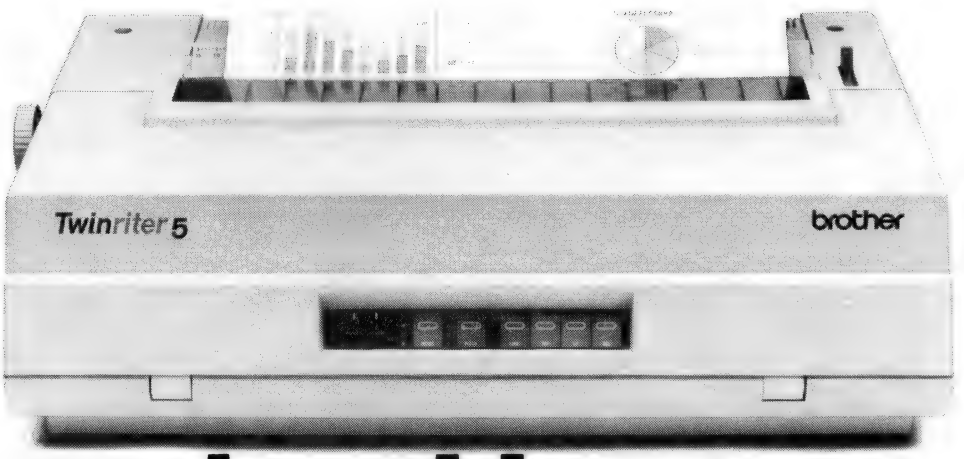

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CSO 1360

GO FORTH AND COMPUTE?

Roy Hill doesn't have a lisp — when he says 'the Forth be with you', he means he really likes the flexibility of the Forth language.

FOR MANY years I was dedicated (addicted?) to the Forth language, despite the absence of a genuine 'hobbyist' application for the microcomputer enthusiast. The situation has now been remedied with the recent introduction of the RSC Forth kit, available from Energy Control, PO Box 6502, Goodna 4300.

The kit is based on the Rockwell R65F11/R65F12 chip set, which uses a microprocessor based on the 6502. It's one of the new generation 'single-chip' microcomputers. The R65F11 contains the following:

- An enhanced 6502 microprocessor (containing extra bit setting and testing facilities).
- An internal clock-oscillator.
- 192 bytes of RAM
- 3 Kbytes of ROM (which contains the Forth Kernel)
- Two 16-bit programmable timer/counters
- A full-duplex serial I/O channel with programmable baud rates and variable parity/bit settings.
- Ten interrupt levels
- Capability for bus expansion
- Special EPROM programming and bank-switching commands
- 16 bi-directional I/O lines, eight of which provide input latching and another four of which provide for edge-sensitive transitions.

The Forth kernel contains 133 Forth 'words', which are based on the FIG (Forth Interest Group) model. These words provide the user with the most commonly used Forth dictionary, but another 153 words (including disk-handling words and a Forth assembler) are contained in a special development ROM (called the R65FR1), which is also provided with the kit.

The review kit I received is built on a board which measures 203 mm by 138 mm. Provided with the kit were all necessary chips and hard-to-get components, as well as the RS232, disk, and printer and expansion connectors.

While building the board, I discovered several minor faults. I pointed these out to the distributors, who assured me they'd be rectified before general release. The kit took two hours to assemble and isn't beyond the powers of any amateur electronics enthusiast with a decent soldering iron. A word of caution: the kit isn't supplied with sockets. Although it can be built by soldering the chips directly to the board (with the usual precautions required for handling CMOS components), the small extra cost involved in installing the sockets is well worth the effort.

Hazy Instructions

The kit's assembly instructions are rather hazy for the rank amateur (I had to enlist the help of some electronic geniuses to complete construction); however, the local distributors of the product are only too ready to listen to any gripes and make whatever changes are necessary to improve the documentation.

A WD2793 floppy disk is an optional controller chip, which, when combined with the disk words in the development ROM, allows standard Forth mass storage (in the form of 1024 byte Forth 'screens') to be implemented easily.

Setting up the WD2793 requires the use of a fairly sensitive CRO, but the details of setting up are well covered in the WD2793 application note. For the potential constructor who doesn't have access to a CRO, the distributors are providing a guide to the optimum settings for each of the three components involved (two trimpots and a trimmer capacitor). These components aren't intended to be supplied with the kit because they're usually stock components in the home workshop.

Disk drives shouldn't be a problem, as the WD2793 is designed to operate with both 20 cm and 13 cm drives in both single-sided and double-sided varieties.

Fires Up Perfectly

The board fired up perfectly first time, using my KTM 2/80 terminal to communicate with the RSC board. The only problem I had was adapting my non-standard KTM to the + and — 5V serial interfaces on the RSC Forth board; subsequent issues of this board should have all minor bugs fixed.

Any standard ASCII terminal (or computer with a serial card) should have no trouble interfacing with the RSC Forth board.

The kit also comes with a 250-page user manual, which provides all the necessary working knowledge of the board, including a tutorial on the Forth language. However, the manual falls into the usual trap of computer documentation, and tries to be all things to all people. Some parts of it are very good, but it suffers from two *big* faults: it moves very quickly from the simple to the more difficult concepts of Forth, and requires about five readings to locate all the information.

No Index

The latter difficulty is due largely to the fact that the manual has no index. An application note (R65F11.R65F12) provides a cir- ▶

MEET THE BROTHER M1509 HIGH-SPEED DOT MATRIX PRINTER

This new printer is not only very fast and very quiet, it's also very inexpensive.

At $799, 180cps and 136 columns it will out value and out pace any rival.

And because of its extremely low noise level it will fit peacefully into any office environment.

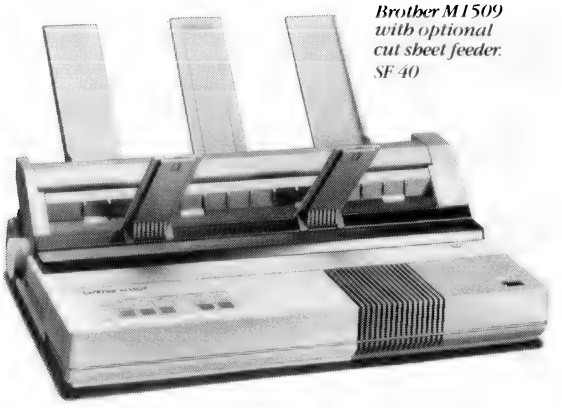
Brother have built a reputation for innovation, design excellence and proven reliability and we have put them all together in this exceptional machine.

Consider these features and see if you can find better value,

- High Speed output (180cps), Near Letter Quality printing (45cps)
- Big 3K byte buffer memory.
- Dual Interface (Centronics, RS232C)
- IBM plus Epsom Compatibility built-in.
- Optional cut-sheet feeder.
- Compact and lightweight.
- Optional NLQ font board available (LQ-200)
- High Density Charts and Graphics Printing

Accessories that further enhance cost efficiency.

Brother printers deliver exceptional value-for-money and when you add the time and cost saving benefits of the optional cut-sheet feeder, it's obvious why the Brother printer accessory package has got business people in raptures.



Brother M1509 with optional cut sheet feeder. SF-40

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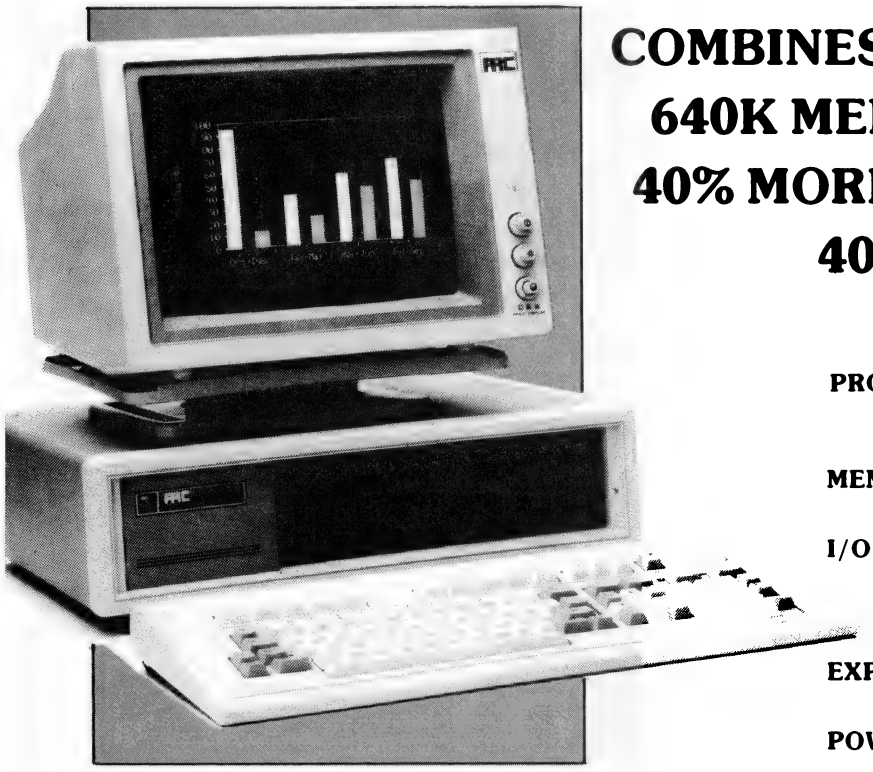
CSO 1560 B

THE ARC TURBO COMPUTER COMBINES 8088-2 SPEED WITH 640K MEMORY TO GIVE YOU 40% MORE PERFORMANCE AT 40% LESS COST



TECHNICAL SPECIFICATIONS

PROCESSOR	CPU 8088-2 @ 4.77-6.7 MHz Optional 8087-2 Co-processor
MEMORY	RAM 640Kb Standard on Board
I/O CHANNELS	Disk Controller, Parallel Printer (Centronics) Dual RS232 Serial & Game Interface Clock & Calendar.
EXPANSION SLOTS	Total of eight Expansion Slots (two are occupied).
POWER SUPPLY	200W Power switching power supply.
DISK DRIVES	Dual DS/DD 5¼" 360Kb Disk Drives. Optional 20Mb Hard Disk Drive.
KEYBOARD	99 Keys including special function keys. (5151-type.)
MONO DISPLAY	Taxan 12" P39 green or amber display 80 chrs x 25 lines.
COLOUR DISPLAY	Taxan 12" Hi-res Colour Display 40/80 chrs x 25 lines.
SOFTWARE	MS-DOS 3.1 operating system RAM disk & printspool software.

- **The Arc Turbo features a high level of quality and user oriented technology.**
- **The Arc is backed Australia wide by a 12 month warranty.**
- **A growing network of agents provide support and backup.**

PRODUCT HIGHLIGHTS

8088-2 Turbo processing
640 Kb RAM Standard
6 Free Expansion Slots
12 Month Warranty
Choice of Mono and Colour Displays.
Superior Keyboard
'Enable' Integrated Software.

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cuit diagram and a brief description of the functions of the board, and is also intended to provide all necessary construction details. I'm a reasonably experienced 'hardware hacker', but I had some problems because of the breezy manner in which some of the vital instructions are glossed over. The distributor has assured me it is compiling a small 'problems' book, which will cover all these points.

There is no editor provided with the Forth dictionary, but the necessary source screens for a simple line-oriented editor are provided in the appendix, and are further developed into a 'hyperhack' screen editor. These all take up valuable RAM, so you may have to extend the board's RAM (and hence address decoding and jumpering requirements).

As it stands, the RSC (Rockwell single chip) Forth board is an excellent development tool, and when combined with several recently developed accessory boards it will be almost indispensable.

As it stands, the RSC (Rockwell single chip) Forth board is an excellent development tool, and combined with several accessory boards currently being developed will be almost indispensable.

An A/D converter board and an EPROM/Bipolar PROM/PAL programmer board are in the pipeline.

The RSC Forth board costs $159 as a kit. The EPROM board is expected to cost around the same and will handle everything up to 256 Kbyte EPROMs, as well as bi-polar PROMs and PALs — I can hardly wait for its release.

I should also mention that this particular version of Forth can generate 'headerless' code. For those who haven't yet been introduced (or should I say 'converted') to the flexibility of the Forth language, headerless code is used to generate stand-alone applications. That is, the developed program has the header part (the part containing the name of the word and its length) removed in order to save valuable ROM space. This program then only requires a certain minimum hardware configuration in order to function as a dedicated burglar alarm system, hothouse controller, EPROM programmer, automatic telephone dialler, intelligent serial-parallel/parallel-serial converter, 8 Kbyte print buffer, and so on. The possibilites are limited only by your imagination. □

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You have a choice of drawing tools: pencil, brush, spray-can, fill can, eraser.
Draw points, lines, boxes, elipses or handcrafted drawings.
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Zoom editing – allows you to edit your art in fine detail.
Pictures can be saved on or retrieved from disk, or printed out.
BEESLIDE – a variable speed slide-show package; user defined order and files.
Min. Requirements: 32k Microbee, CP/M, 1 disk drive [40 track DSDD], Epson compatible printer [option].

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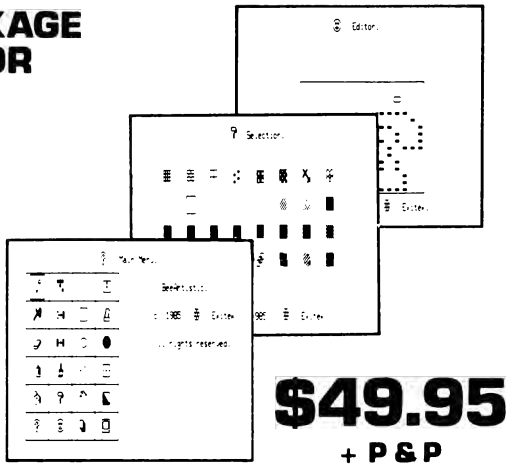

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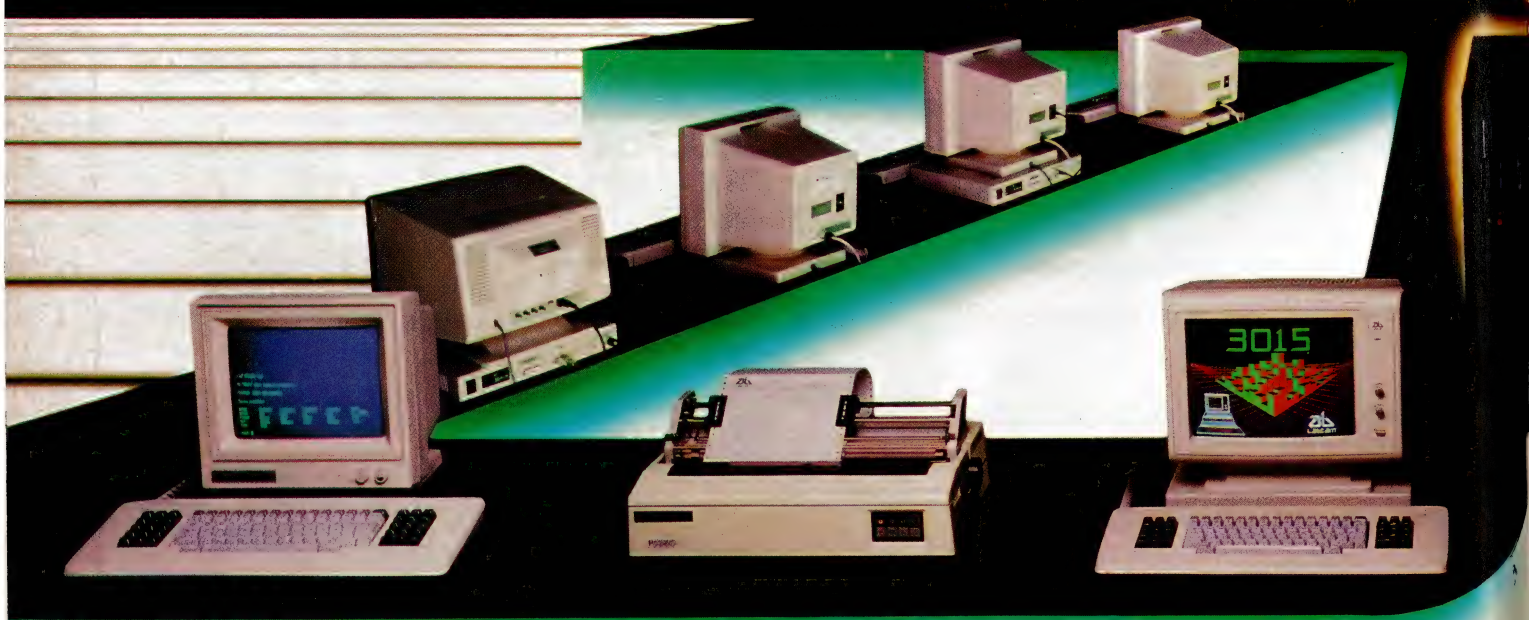
Labtam now offers the first commercially available implementation of National Semiconductor's 32032 microprocessor in the world.

Labtam's new true 32-bit range builds on the company's solid foundation of expertise in design, manufacturing and international and domestic marketing of high performance business computers and leading edge scientific instruments.



LABTAM, AUSTRALIA'S LARGEST COMPUTER MANU
OF LABTAM UNIX SYSTEMS AT SOME O

Labtam 3015/V32 Floorsystem -

☐ 2 Mbyte RAM expandable to 12 Mbyte via Labtam's "X" - Bus 32 bit memory connector. (52 Mbyte/Sec.)

☐ 71 Mbyte Winchester disk, 45 Mbyte streaming tape, 1.2 Mbyte 8" floppy disk.

☐ 8 RS232C serial channels, 800 x 600 pixel graphics terminal expandable to 16 users.

Labtam 3004/V32 Desk Top

☐ **1 Mbyte RAM expandable to 2 Mbyte.**

☐ **20 or 40 Mbyte Winchester disk drive.**

☐ **5¼"** 800K formatted floppy disk drive.

☐ 5 RS232 serial channels, 800 x 600 pixel graphics.

Operating System Unix System 5.2 Version 2

☐ Demand paged virtual memory.

☐ Memory Management for 16 Mbyte/process.

☐ File and record locking for multi-user access.

☐ File system hardening (protection).

☐ Fortran 77 enhancements.

☐ All standard utilities & C language.

Natsemi 32032

☐ NS 32081 64 bit double precision floating point mathematics processor.

☐ NS 32082 demand paged virtual memory management.

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...FACTURER, HAVE TO DATE INSTALLED A NUMBER ...F AUSTRALIA'S LEADING ORGANISATIONS

C FOR SMARTIES

Continuing his series of series on programming languages, Les Bell introduces one of his favourites.

AS MANY READERS will know by now, I spend a part of each week developing software. I'm not interested in — indeed not temperamentally suited to — writing standard business accounting software and the like, although I can do it when I have to. I'm much more interested in developing technically oriented programs, such as text processors, compilers, report generators, communications utilities and the like.

These programs could be written in BASIC, for sure — but not by me. BASIC suffers badly from some restrictions: support for only a few data types; restrictive variable names; use of line numbers instead of meaningful labels; globally active variables; and generally low support for good structured programming practices. Since I develop software for money, I'm interested in efficiency, and for all these reasons, BASIC is generally unsuitable.

What are the alternatives? I've expressed my fondness for PL/I often, and I expect to go on using it for a long time. It's a particularly powerful language for scientific, technical and commercial programming, and it serves equally well for text processing and utilities, as many utilities I've written will show.

FORTRAN is pretty well dead, except among diehards, even with the recent release of some excellent FORTRAN 77 compilers. COBOL is not, on microcomputers at least, supportive of good structured programming practices. Pascal is dead, although Turbo lives on.

However, in the medium term, I expect support for the C programming language, particularly in the Unix environment, to be much the strongest. In fact, it is already. Consequently, I've been keeping my C programming skills sharp by writing the occasional utility in C, even when I could have done it in PL/I.

C is going to be increasingly important in the next few years. It will be the standard language for all **systems programming** tasks, with assembler being rightly displaced for this activity. It bids fair to become the major programming language for many other kinds of programs too. Why is this?

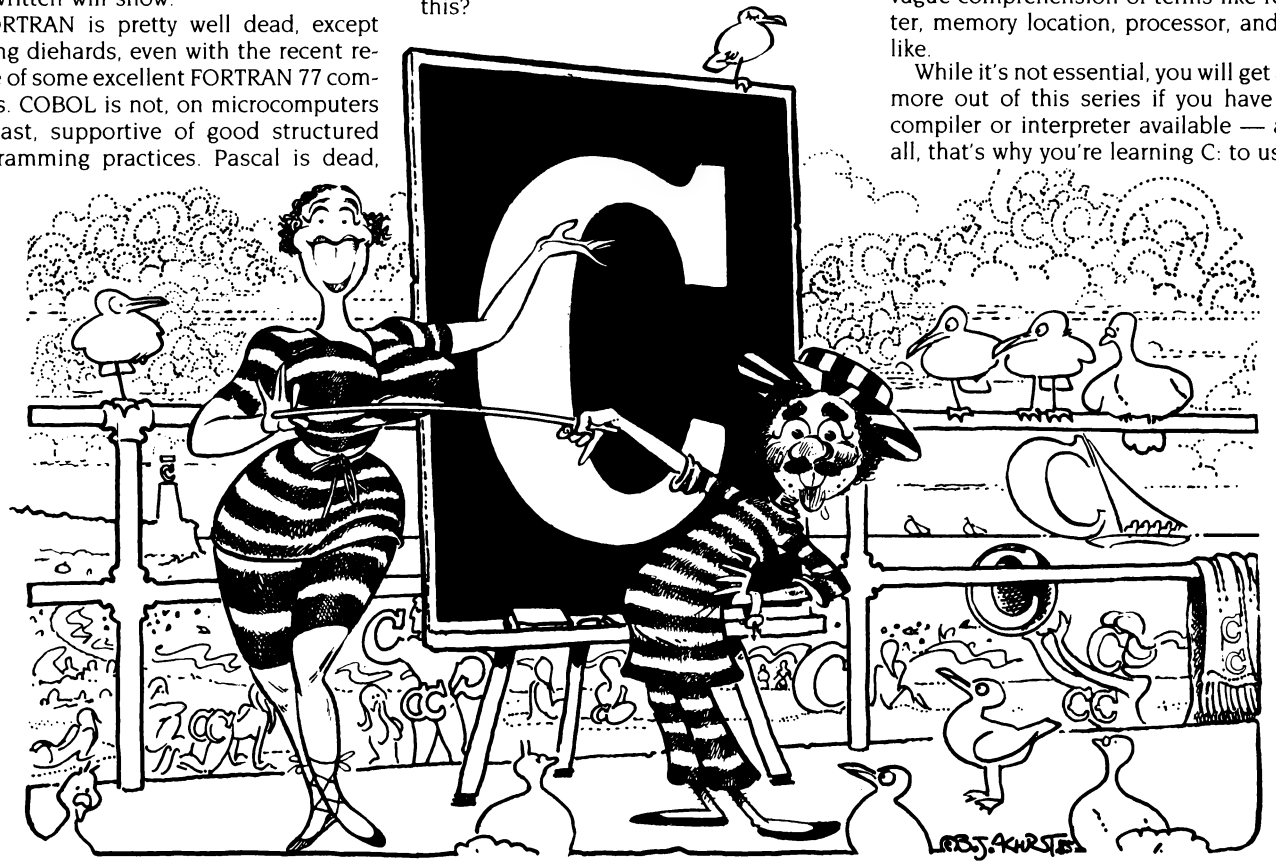
Power to the Programmers

In part, it's because most programmers who were brought up on BASIC are now ready for a more powerful language. It's also because there is a number of excellent C compilers on the market, and again because many university graduates now working in the field have been taught C at university. Finally, it's because many software houses are offering C support libraries for everything from asynchronous communications support to windowing.

In this series of articles, I intend to teach the elements of the C programming language, together with some of the elements of good programming style, and the ability to put the two together constructively. As far as possible, this will be through the medium of constructive and useful examples: text processing programs, small utilities, a small interpreter modelled on dBase II (I'll never escape it!) and the like.

To get the best out of this series, you'll need a couple of prerequisites: one, the ability to program in some other language such as BASIC, COBOL or dBase II; and secondly a basic understanding of computer architecture. By this I mean at least a vague comprehension of terms like register, memory location, processor, and the like.

While it's not essential, you will get a lot more out of this series if you have a C compiler or interpreter available — after all, that's why you're learning C: to use it.



C FOR SMARTIES

For owners of eight-bit computers running CP/M, I recommend BDS C as being the best value. While it lacks some features of the full C language, it's more than adequate for learning and for writing quite sophisticated utilities.

For owners of 16-bit machines, several compilers will do the job. If you want to learn C on an IBM PC and run it on some other machine, then I'd recommend the Understanding C interpreter from Computer Innovations, which is great for learning but too slow for running production software. For that job, any of the following should do the job: Computer Innovations' Optimising C86, Lattice C, Digital Research C or Microsoft C. I'll be comparing my code examples against BDS C, CI C86, Lattice C and DR C, and advising of any differences.

Just out of interest, we're using the Computer Innovations compilers for Concurrent CP/M and PC-DOS in our office. An alternative to those mentioned, for those looking for an inexpensive 16-bit C compiler, is deSmet C, which at $US109 seems to be a bargain on a par with BDS C. However, I won't be 'supporting' it in this series. As far as possible, all example code will conform to Unix 'standards' of portability.

The accent in this series will be on writing small, useful programs that illustrate some point about the C language. I'm particularly keen that they be useful, because otherwise they will have an artificial and contrived flavour. So we'll be writing programs to do things like letting you type multiple DOS or CP/M commands on one line, fixing up corrupted textfiles, calculating the Fog Index of text, and, for the grand finale, writing a complete interpreter for a dBase-like language.

In this series of articles, I intend to teach the elements of the C programming language, together with some of the elements of good programming style, and the ability to put the two together constructively.

C for Yourself

Having set the scene, let's first of all examine a few key points about C.

First, C is designed to be a **compiled** language. It doesn't always have to be compiled, but if interpreted it loses one of its major advantages — its speed. What do I mean by compiled and interpreted?

Compilers and interpreters are both language translators. The difference is that the interpreter executes the program instructions as it translates them. For example, a BASIC interpreter lets you type in a program and then type RUN to immediately execute it. The BASIC compiler, on the other hand, only translates the BASIC program into a form of machine code, which can then be loaded into the computer and run.

Since compilation and execution are separate processes, program development can take longer with a compiler (which is why I recommend Understanding C above). On the other hand, there is a compensating advantage: an interpreter performs the translation step every time it executes a program — in fact, it translates every line of a program every time it executes it, even if it has translated it before — so that the interpreter is much slower than compiled code at run-time.

Compilation also has other advantages: since no source code is distributed, no-one can slightly adapt the program and resell it as their own, and users can't tamper with it and then abuse you when it doesn't work.

Compilation is actually a two-step process for most languages, and this is used to good effect by most C compilers. The first stage — which in itself can be four or more sub-stages — reads the C program and outputs the resulting object code in **relocatable format**. This is code that is not yet committed to residing at any particular address in memory, and furthermore, it is not the complete code for the program.

Much of the work of any program is done by subroutines: that is, blocks of code which perform tasks which frequently crop up in programs. Examples would include arithmetic on numbers, printing strings of characters on the screen, copying strings around in memory and so on.

Most compilers do not generate the code that performs these low-level tasks; instead they generate simple sequences of instructions which call subroutines to perform them. For example, you might write (in any high-level language):

A = B + C

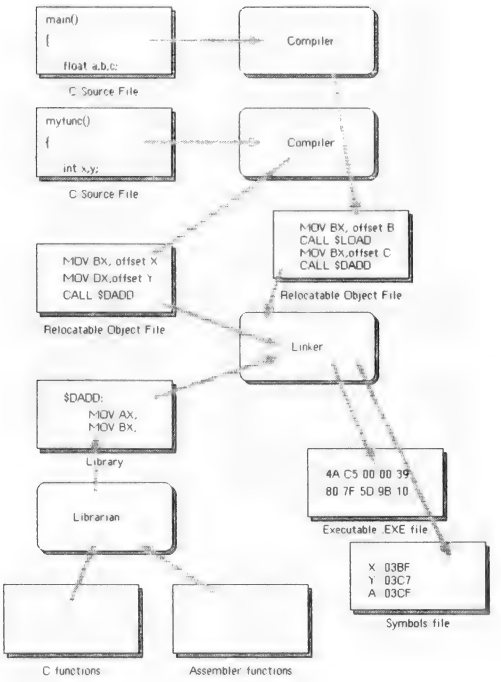
and this would compile into the following sequence of instructions:

Get the floating point number at address of variable B *into the floating point accumulator.*

Add the floating point number at address of variable C *to the floating point accumulator.*

Store the result to the address of variable A.

This would correspond to several hundred lines of assembly language code. In fact, the code generated by the Computer Innovations Optimising Compiler for that statement looks like this:



Functions, Libraries and More

Notice the compiler simply assumes there are three subroutines ($FLOAD, $DADD and $FSTORE) which do the hard work. It's a valid assumption; in fact, the compiler explicitly knows that such subroutines exist, since it's designed that way. In C, such subroutines are known as **functions**.

But where are the functions? They are actually in a separate file of relocatable object code called a **library**. This contains all the functions which perform the low-level tasks required by a running program. The **linking loader** combines the relocatable code for the main program with the required functions from the library, fixes all the addresses that were previously unknown in the program and outputs the executable (.COM, .CMD, .EXE) file.

Where did the library functions come ▶

from in the first place? They were written by the compiler manufacturer; the very low-level ones written in assembly language (someone has to suffer), while the next level up are written in C to use the lower-level functions. Most compilers actually come with the complete source code for their libraries, and the user can recompile the libraries with custom modifications. This is a major feature of the C language.

There is another benefit: while certain functions are provided by the compiler manufacturer in the compiler's library, you'll no doubt want to construct your own collection of useful subroutines. Using the librarian utility usually supplied with the compiler, you can do exactly that, either adding your own higher-level functions to the compiler's standard library or creating your own libraries. This means C is an **extensible language**.

I want to make a very important point here. Many of the 'verbs' of the C language, such as the string-handling functions **strcpy** and **strcat**, or the output command **printf**, are not statements or commands in the C language at all. In fact, they are simply functions in the library. This means that, since they are not part of the language, they are not required to be standardised, and indeed, they can vary from compiler to compiler.

Despite the temptation, most compiler writers have stuck with the *de facto* standard of the Unix C compiler. However, there are some cases — particularly in file handling — where functions for other operating systems are slightly different from those under Unix.

Why Else is C Special?

C is a general-purpose programming language. It lends itself most to system programming, and during its nascence at Bell Labs that was what it was mostly used to do: write compilers, text analysers, editors, print formatters, operating systems and the like. It is not restricted to this, however. It is possible to write accounting systems, scientific and technical programs, weapons control systems, econometric models, share registries, in fact virtually anything, in C. It won't do all of these well, but on average, if applied to all programming projects holus bolus, it would have as good a success rate as any other language.

C is distinguished from other languages by a number of features. First, there's its sparse syntax, which encourages shorthand coding. This can work for you and against you — for you, in the sense that certain constructions become automatic, rather as my fingers can type '-ing' and 'the' with no conscious effort; against you, in that until recognition of these constructions is automatic, reading them can be pretty tough, and even afterwards, some constructions can be pretty tough to make sense of. This particularly applies to maintenance programmers who are reading code they didn't originally write.

Compilers and interpreters are both language translators. The difference is that the interpreter executes the program instructions as it translates them.

Secondly, there's C's richness of flow-control functions. While it's possible to write code with just three fundamental constructs — straight-through flow of control, the if-then-else and the while constructs — C gives the programmer many more to choose from. It is thus possible, in many cases, to simplify the expression of an algorithm and produce code that is easier to read and runs faster or uses less memory.

Thirdly, there is the fact that C lives 'close to the machine'. Its data types generally reflect the register sizes of the machines it runs on, and in fact for many types they are defined not by the language, but by the machine — which can cause heartache to programmers who are porting code between machines. But this low-level capability is very useful for writing systems utilities and for optimising existing code for speed.

C is one of only a very few languages, for example, to provide left and right shift operators (<< and >>) and to distinguish between bitwise and logical AND and OR. It can thus generate code that would otherwise require assembly language.

Finally, one unique characteristic of C is its heavy usage of — or indeed, reliance upon — the pointer data type. This is at once C's most powerful and most dangerous facility. For those who have not encountered them, pointers work rather like dBase II's macro facility and are similarly dangerous. Used with care, however, they make all kinds of things possible.

Despite this apparent complexity, C is actually quite a small language, and is well-structured and easy to learn. It very much reflects the thinking of one man, Dennis Ritchie, and like many such artefacts, it works well. Just how well, you'll start to see next month.

Glossary

(Incidentally, this glossary is produced by a C program called **gloss**, which you will see later in this series. C programs actually do much of the text processing and typesetting at *Your Computer*.)

Unix — The Unix operating system is written entirely in C. While it has traditionally been a minicomputer operating system, versions of it have found their way onto microcomputers and there are even versions for machines as small as the IBM PC.

Compiled — translated into machine code. Compiled code is the fastest way to run a program written in some high-level languages, which is why there is much discussion about dBase compilers.

Extensible language — one which can be added to and built into a higher-level, and specialised, tool.

Functions — the low-level sub-programs which perform tasks such as input/output or string handling for a C program.

Library — a collection of C functions, maintained in relocatable object code format inside a single file.

Linking loader — a program which searches through one or more libraries for the library functions required by your program, extracts them and links the whole lot together to form a runnable program.

Relocatable format — code which has not yet been fixed to any particular location in memory. Code in relocatable format is not directly executable and usually contains references to subroutines or functions in other modules or files, which will have to be resolved by the linking loader.

Systems programming — the writing of programs which are not applications in their own right, such as operating systems, compilers and interpreters, print formatting utilities, editors and the like. An old joke about systems programmers is that they would rather write programs to help them write programs than write programs. □

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THE IBM-APPLE CONNECTION

Do you have an IBM PC *and hanker to use the Apple Laserwriter, but you're not quite sure how to make the connection? Microsoft's Andrew Laikin shows how to connect the two and print documents from Microsoft Word.*

IF YOU have an IBM PC running Microsoft Word (version 2.00 or later), a standard IBM Asynchronous Adaptor and an Apple Laserwriter, you can get them all talking happily to each other by using the following procedure.

First, you'll need a cable to connect the computer and printer. Table 1 illustrates the necessary pin connections. (If you're now asking yourself, "How the hell do I make a cable?", just turn to the article in this issue specifically devoted to the art of cable-making.) Connect this cable between the IBM PC and the Laserwriter, and set the mode control on the Laserwriter to '9600'. Turn on both machines.

The Laserwriter should, as part of the power-up operation, output a test page

After the IBM has the PC-DOS prompt 'a>' on the screen, type the following command:

A> MODE COMx:9600,N,8,1,P

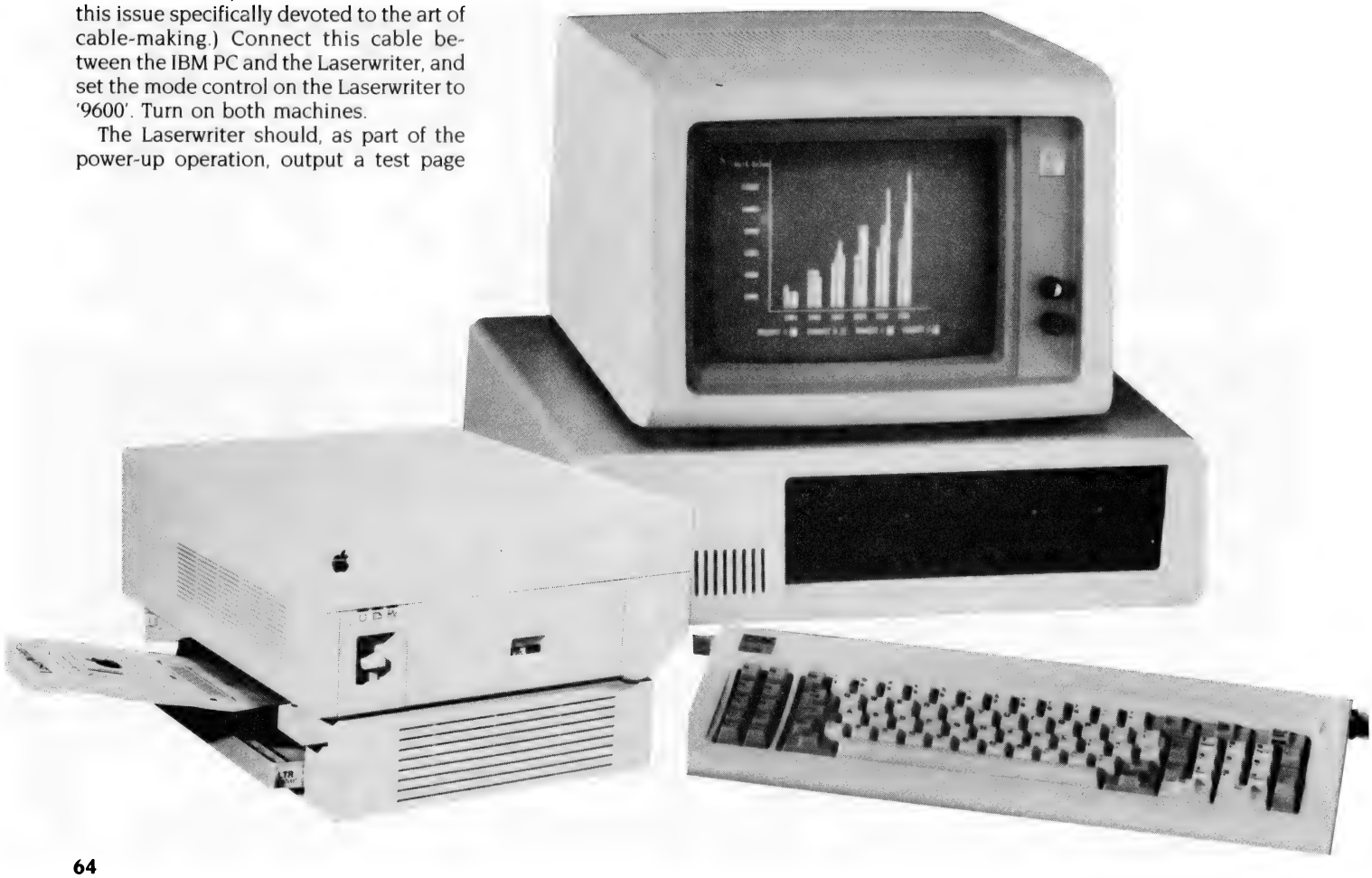
(where 'x' is the number of the asynchronous adaptor used by the printer).

Insert the Word Utilities Disk in drive B and type the following command:

A> COPY B:MSSETUP.PS COMx:

After a short delay, the Laserwriter should output the message 'Ready for Microsoft Word output' in large type (see Figure 2). If this process happens to be repeated for some reason, the Laserwriter will produce the message shown in Figure 3.

If the Microsoft Word program disk doesn't have the Laserwriter driver on it, now would be a good time to copy it across from the Utilities disk. The file you should look for is 'APPLASER.PRD'. It would also



be a good idea to copy the file 'MSSETUP.PS' to the Program disk.

Insert the Microsoft Word program disk in drive A and start Word as suggested in the manual for your particular system; select the APPLASER printer from the list in Print Options; quit Word to save the setup, then restart Word.

The Laserwriter should be ready for operation.

If you've installed PC-DOS on your program disk, you may like to set up the following AUTOEXEC.BAT file to automate the installation process.

```
VERIFY ON
MODE COMx9600,N,8,1,P
COPY MSSETUP.PS COMx:
WORD
```

You may have to copy the MODE program from your PC-DOS disk onto your Word program disk to get this to work properly.

Points to Watch

1.If you're using a communications adaptor other than number 1, you may have to change the 'Setup' field in the Print Options to the device you are using: for example, 'COM2:'

2.Word doesn't consider the respective heights of the various fonts available on the Laserwriter. This means you'll have to adjust the line spacing for each paragraph which uses a font other than the default. The line spacing can be easily set up using Table 2. □

Table 1.

Font	Size	Spacing (Li)
Courier	10	0.9
Courier	12	1
Courier	14	1.2
Times-Roman	8	0.7
Times-Roman	10	0.9
Times-Roman	12	1
Helvetica	12	1
Helvetica	18	1.5
Helvetica	24	2

Table 2.

IBM end (DB25 female connector)			Laserwriter end (DB25 male connector)
TxD	2	3	RxD
RxD	3	2	TxD
CTS	5	20	DTR
Gnd	7	7	Gnd
RLSD	8	14	Fault

The compiler for dBASE III has arrived in Australia.

Clipper Compiler Nantucket

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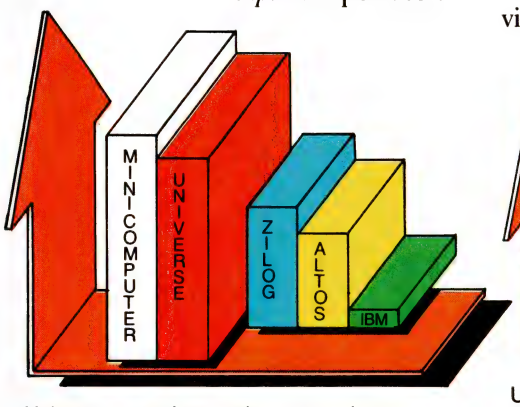

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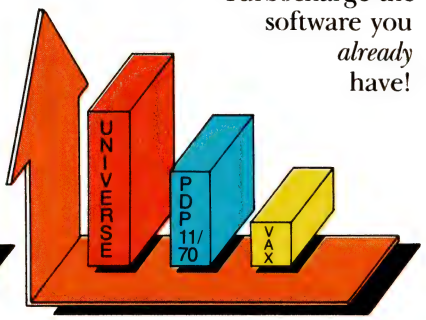

Universe has excellent performance/cost ratio compared with mini computers.

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Your staff need to switch between tasks. So Universe obliges.

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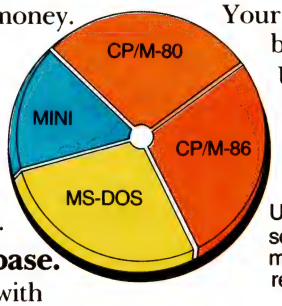

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Benchmark

The benchtest used was provided by BYTE magazine and is the Sieve of Erastosthenes prime-number program (10 iterations). Note that all performance is for a single user system only.

COMPUTER	PROCESSOR	OPERATING SYSTEM	LANG.	TIME (sec.)
AED UNIVERSE	80286/8	MP/M 8/16	C (D.R.I.)	1.8
ZILOG	Z8000	ZILOG	C	4.0
DATAMAX	80186	C-DOS	C (D.R.)	4.3
WICAT	68000	UNIX	C	4.7
ALTOS	8086	XENIX	C	6.0
LABTAM	8086	MC-DOS	Fortran 77	7.0
DEC	LSI-11/23	XENIX	C	9.3
IBM PC	8088	MS-DOS	C (D.R.)	12.4
OSBORNE	Z80A	CP/M	C (BDS)	15.2
DEC PDP-11/70		UNIX	C	1.5

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Reviews

Real High Res for Apples **69**

Mono, monotones, monotony ... Jon Fairall was getting the black-and-white blues with his Apple IIc's display when a new colour monitor landed on his desk — plonk! — with an RGB interface for the Apple. The addition of a graphics package soon found him bathed in the light of a high-resolution rainbow.

Tandy Tries Compatibility **72**

We don't suppose you need to ask 'Compatibility with what?'. It's easy to become hardened against the queue of clones at our door. They really must offer something over and above the call of IBM, and/or good value for money before they'll earn our praise. Frank Lee sizes up the Tandy 1000.

A Working Bee **77**

Readers and writers are always asking us which of the less expensive machines would make a good workhorse, and the 128 Kbyte Microbee has for some time been high on the list we'd recommend. Jan Roberts, a self-employed writer and film-maker offered to tell of her experiences with a Bee.

All This and Modula-2 ..... **86**

Modula-2 is not just Pascal over-extended — it's a new language in its own right. Using popular and useful applications, David Moore explains how it works.

The NCR PC 4i — A Heavyweight Compatible **89**

No prizes for guessing this machine's genetic origins either. Aside from its monolithic presence, the NCR isn't a particularly outstanding clone — why then was Rose so taken with it?

The King is Dead — Long Live the King **93**

Enter Norton Utilities the third. John Hepworth, a loyal subject, pays homage to this latest version of the 'power tools for computers', outlining what they do and what's new.

Bit Bucket **95**

Tipping out this month's bucket, we found Clickon, "a spreadsheet and graphics desk accessory" for Macintosh users, and Music Construction Set for the Apple II family — Mozart pails into insignificance ...

The Full Colour Printer at The Black and White Price!

OKIMATE 20, just released by OKI, the world respected name for quality printers, can print brilliant colour graphics, charts and original illustrations with exceptional definition. It will print full colour or mono on plain and thermal paper, or create acetate transparencies for overhead projection.

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REAL HIGH RES FOR APPLES

A new monitor, an RGB *adaptor and a tail-wagging package called* Beagle Graphics *transformed* Jon Fairall's *boring mono-display* IIc *into a high-res colour computer.*

WHEN STEVE AND STEVE emerged from the garage and presented the Apple to the world, everyone thought its graphics capacity was pretty stunning. These days, however, Apple graphics look woeful when compared with the capabilities of some cheap machines which have been optimised for game playing.

There's been a rumour floating around for some time that there was a way of improving the situation, especially since the advent of the IIc and the expanded IIe; both have a respectable 128 Kbytes of memory, so you should be able to get decent graphics with that kind of backup. As far as I can determine, the rumour started in an obscure American magazine early in 1984. *Double Hi Res* was the magazine's name, and double resolution (or 560 horizontal pixels) was the claim.

A certain amount of detective work got me nowhere, so I let the idea fester for a while — I believe in serendipity. But things started to move when Adrian Hoess of Megavision in Sydney called and asked me to review his new Taxan Super Vision III monitor.

RGB Interface

Monitors leave me pretty cold on the whole. I mean, what can you say about them? They squat on the desk and glow. But Adrian happened to mention that an RGB interface for the Apple IIc was part of the package, and my ears pricked up. I've always wondered why Apple sold the IIc without an RGB card.

In due course the monitor and its interface landed on my desk. The unit has a 30.5 cm screen with video bandwidth goint up to a respectable 18 MHz, and is capable of supporting a resolution of 640 by 262 lines. The footprint is 332 by 365 mm.

The adaptor is an innocuous little flat pack in the same colour as the IIc. Inside are around 20 chips, but I have no idea what they do because some untrusting sod seemed to have scraped all the numbers off them. A brief perusal of the documentation showed that the interface was specially designed to take the double high-resolution mode. A few phone calls and I had some software to make it all happen. ▶

Computerwave supplied something called Beagle Graphics — the fix at last!

Double-Resolution Graphics

Running Beagle Graphics allows you to choose one of three fundamental configurations, all confusingly called DHGR. You can plot on a 560 by 190 screen, but have to sacrifice colour. (It's possible to get green and blue, but there are limitations, as we shall see.)

You can elect not to increase the resolution, in which case you're stuck with a 280 by 190 screen. The advantage is that you get six colours, plotted anywhere on the screen. Alternatively, you can go down to 140 by 190 resolution with 16 colours.

How is it done? In the standard Apple the screen is memory mapped between locations 8192 and 16384, called page 1. Another page exists from 16385 to 24576. In the normal high-res mode the colour of each pixel depends on the position of the dot and the status of the high bit in the relevant pixel.

Theoretically, if the high bit is low the dot must be black, green, violet or white; if it's high the dot will be black, orange, blue or white. What actually happens depends on where you try to plot the dot. If the x co-ordinate is even you can only plot violet or blue; if the position is odd the dot must be green or orange. If you get the combination of colour and position wrong Applesoft will refuse to plot anything.

These structures apply even if you ask Applesoft to plot white. The only advantage of white is that it ensures that you do get something plotted. The implication of this is that you can't actually get a white colour in high-resolution graphics. This is quite true, as long as you stick to vertical lines on the screen. As soon as the line starts bending, white starts to appear. In fact, white will try to shine whenever you turn on two horizontally adjacent pixels.

Double Resolution

To get double resolution, turn on the 80-column mode. This is a hardware switch in the IIc or a board in one of the slots of the IIe, which speeds up the rate at which data is spooled out of memory. In text mode all the letters are squashed up.

Of course, squashing up the letters doesn't result in 80 columns; it just results in squashed letters. To achieve 80 columns the Apple starts to read out the auxiliary bank of RAM located above 64 Kbytes. There are another two pages of high-res graphics and text here in exactly the same memory locations. This is why you need the enhanced Apple IIe.

The display takes one column from this auxiliary page, one from the original page and so on, to build up interlaced columns on the screen.

Double high-resolution graphics are created in exactly the same way: all the odd-numbered columns are stored in main memory; all the even numbers in the auxiliary memory space. The result is a display similar to the original high-res graphics, with twice the resolution.

This should be the end of a rather simple story. The alternative memory space can be switched in by a soft switch and all the constraints which apply to normal high resolution will still apply.

But unfortunately it's not that simple. Applesoft can't distinguish between the two blocks of memory or access the alternative page area in a controlled fashion.

Beagle Graphics

Accomplishing this task is what the Beagle Graphics package is all about. It allows you to use Applesoft-like commands to treat the two pages as one whole double high-res screen. The package has a program which creates a lot of new commands distinguished by an ampersand prefix. So &HPLOT works as you would expect, as do &HCOLOR and all the others.

Not content with just recreating the old commands, Beagle Graphics creates new ones like &BOX, which creates a box, and &FILL, which fills in an enclosed area with a colour summoned by &HCOLOR. There's a total of 25 commands — all those that Applesoft should have.

The actual display format is set by &MODE(n), where n is between one and four. Mode 1 is 560 dots and two colours, Mode 2 is 140 dots and 16 colours, Mode 3 and Mode 4 are mixed modes which allow you to mix the other two on the screen.

In order to select the 280 width with a genuine six-colour display you have to toggle the command switch on the interface, which has two positions, soft and fix. Soft allows you to select the mode as indicated above. Fix can only support the 280-dot and the 140-dot modes.

As well as the extra program features, Beagle Graphics has a utility program called Double Plot, which lets you create a picture on the screen. After booting the disk, you go to a menu which offers choices like box, circle, line, fill, edit and paint. As you'd expect, these allow you to create a box, draw a line or position a circle with the aid of a mouse, touch tablet or even the keyboard.

There's a cut-and-paste option which allows you to cut out a part of the drawing and reposition it anywhere on the screen. There is even a paint option which allows you to select a brush tip and direct it around the screen. At the end of it all it's possible to use &SAVE to put the picture onto a disk. (It takes twice as long to save as a normal picture and requires two files on the disk.)

There is also a bunch of utility programs on the disk, which do things like convert high-res images to double high res, change the colours around or cut and paste.

Results? It's nice. Certainly it's hard to get interested in doing graphics in HGR after you've been playing around with this package. Its one major disadvantage is that you can't flip from page 1 to page 2 in DHGR, but I'll live with that.

And what about the hardware? With double high resolution you certainly appreciate a good monitor, and the Super Vision III is well worth having. The colours are crisp and clean. It has some nice features like a text switch on the front for a high-resolution monochromatic display, and nicely accessible contrast and brightness controls. (Incidentally, the text switch gives you either a green, amber or inverted screen, and it's styled like the earlier Taxan monitors, in an off-white colour which looks nice next to the Apple.)

Recommended retail prices, including tax, are $775 for the Supervision III monitor, $195 for the Apple IIc RGB adaptor and $79 for Beagle Graphics. □

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TANDY TRIES COMPATIBILITY

What can one say about another PC clone? As it happens, quite a bit. To be successful in the Me-Too stakes, a manufacturer needs to have something apart from price to tempt the customer away from Big Blue. Frank Lee tested the Tandy 1000 and found it lacks that certain something.

HO HUM. Here we go again. Yet Another PC-Compatible. Will the tide ever be stemmed? At a rough guess — not for many moons.

When the first IBM PC appeared on the market, its great appeal was those three letters right up front where your neighbours could see them. Having your own IBM computer still carries a certain panache, and places its owner in a unique class of citizenship.

By contrast, "I have an IBM PC workalike" just doesn't seem to carry the same degree of sociological impact. It's likely to be followed by "Why didn't you get the Real Thing?"

Australians, unlike Americans, tend to be less fussed about Real Things. We tend to go for daisywheel printers which work like Qumes, rather than buy the Real Qume. It's the same with PCs. The dollar difference means more to us, perhaps, than the desire for reflected glory.

But once outside the camp, whose lookalike shall we buy? It's a very wide choice.

As regular readers will know, I have been using PC compatibles consistently for some years. My latest is Ron, a President 16-210 with a 10 Mbyte hard disk and lots of goodies. He's well documented, and works just like an upgraded IBM PC.

And so it was with baleful eye and heavy heart that I viewed this latest arrival on my doorstep — the Tandy 1000. "Please, Frank", says Matt, "2000 words on this engine by last Friday." I salute, mutter an ancient execration, then think to myself "It either works like a PC or it don't. What else?" Well, here's what else.

A System Tour

Nicely packed, that it is. But then, so are they all these days. Out came the main logic unit, complete with two half-height, double-sided disk drives. Then a classy-looking RGB monitor labelled CM-2, allegedly high-resolution. Finally a separate keyboard which in no way resembles that of the Real Thing.

I belong to an organisation pledged to the overthrow of the IBM PC keyboard. Word joiners worldwide loath the thing. Fortunately, most of the clone makers have selected a vastly improved keyboard manufactured by Keytronics for their machines. I 'm sure Ron's keyboard comes from that stable.

But Tandy's keyboard is totally different — from its connecting plug to its key layout. Frankly, as I write this article on that selfsame keyboard, I grow to hate it more and more.

For starters, it's has a Caps Lock key just to the left of the normal shift key. I dong it every time! And why did they dispense with the asterisk on the unshifted Print Screen key? The Delete and Insert keys have been displaced out of useful reach, and it took about 30 seconds to find the Alt key. On the plus side, there are two extra function keys, F11 and F12, but there's not much software around which could use them. More importantly, if you've become used to the regular IBM layout, this board will drive you crazy until you relearn it. Lotus-eaters will disapprove of the repositioning of the function keys, as they will not be able to use the standard keytop overlay for that product.

The keyboard has adjustable tilting legs, but its 'feel' is too light for my taste; there is no acoustic or tactile feedback to let you know you've hit it effectively. Its only saving grace is an additional Enter key at the lower right corner.

The RGB monitor is an RGB monitor. Its resolution doesn't seem as good as that on Ron's (a CAF) but it's hard to be sure. There was no problem in interchanging Tandy's monitor with Ron's; both have a standard IBM interface. The Tandy RGB controller circuitry is integral on the main mother board, so no separate controller card is required.

The main unit is surprisingly light, but then I've become used to lugging Ron and his hard disk all around the countryside. I would have expected it to be a bit heavier since it sports a fair-sized fan and Tandy hasn't skimped on the power supply. The reset button is up front, right alongside the keyboard connector, but it's unlikely to be inadvertently pressed since it's located under a recessed ledge. There are also two up-front sockets for joysticks. All this clearly leaves no room in the casing to accept an internal hard disk system.

The rear of the main unit is surprisingly sparse. On the extreme left is an edge connector labelled 'printer'. That one really worried me. Quite apart from a lack of indication as to whether it was parallel or serial, any reasonably sturdy connector is going to give the motherboard a really rough deal. Why didn't they use the standard 25-pin interface for which cables are readily available?

Before moving on, perhaps this is the point to indulge my biggest gripe. Where is the Tandy 1000's technical documentation? Tandy knew we would be reviewing this machine, so why did it hold back on the one thing which can make or break a new computer? The documentation packaged with the machine was minimal, to say the least. As a result, I can only guess at the printer interface. More on the documentation (or lack of it) below.

Next to the printer connector is a nine-pin plug labelled 'lightpen', a similar plug for the RGB monitor, then a couple of RCA connectors labelled 'video' and 'audio'. I have no idea what comes out of the 'audio'. According to the manual it's a three-voice

'sound circuit', but no further information is given. A NOISE command in BASIC is available to drive it, but there were no sample BASIC programs to show off this feature.

Finally, there are three possible extension card positions. One of them has already been consumed by a 256 Kbyte RAM card, leaving two slots for other goodies. A bit thin, methinks.

The plastic cover is easily removed and reveals a fair bit of space inside. The power supply is a little smaller than average, resulting possibly from the decision to support only three card slots. One nice feature is the rather larger than average built-in audio speaker.

The motherboard looks standard enough, but much of it is hidden beneath the two disk drives. This could present a maintenance problem, but the Tandy is not alone in this respect.

The (So-called) Documentation

The supplied documentation consists of four small booklets accompanied by two diskettes. The main booklet is an *Introduction to the Tandy* 1000 subtitled 'A Tutorial to Deskmate'. Only 16 of its 118 spiral-bound pages relate to the hardware and operating system (mercifully MS-DOS 2.11). Nor is this an oversight. According to the manual, all one gets with the computer is the hardware (as described, although normally only with one disk drive and 128 Kbytes of RAM), MS-DOS and BASIC, a Deskmate diskette, and these manuals. A full MS-DOS manual and a programmer's reference manual are separately available from Tandy stores.

One can add a variety of boards (modem, memory expansion, serial port, hard disk controller, additional disk drive, and a Digi-Mouse/Controller Clock Calendar board) to the 1000. There is no indication as to whether these boards (or the slots) are IBM hardware-compatible, although the slots look genuine enough. A disclaimer in Tandy's printed service policy warns against using non-Tandy boards; this can void your warranty.

A second booklet of about the same size is the reference manual for Deskmate, an 'integrated system' which is described as a "versatile, easy-to-use set of applications and functions designed to save you time, energy and space." It features seven 'subfunctions' available at any time, plus six applications. These are a primitive word processor, a worksheet, a rolodex card filing system, a communications package, calendar, and a mailing system.

The two remaining half-sized booklets are a BASIC Reference Guide, and a Quick Reference Guide to Deskmate; the contents of both are skimpy, to say the least.

Frankly, the documentation in toto is minimal. I would have expected the MS-DOS and programmer's reference material to have been bundled with the system as a matter of course.

How it Performs

First up, we tried the good old Microsoft Flight Simulator. This is generally regarded as the acid test for compatibility. The weird keyboard layout doesn't help much, but the keys seem to do the right thing. The function keys are supposed to control the throttle and flaps, but their horizontal layout at the top of the keyboard makes these very difficult to use. For some reason one cannot hear the simulated engine noise, so it's probably on a non-standard port. Almost, but not quite.

Wordstar behaves respectably, and I could not detect any differences between its performance on the Tandy and the President.

So too did Sidekick, Speedit, Lotus 1-2-3 and Open Access. To make a final comparison, I ran my standard benchmark program (an Eratosthenes' Sieve which determines prime numbers). The program is written in PL/I. Surprisingly, the Tandy was marginally faster than the President; but mainly in the area of disk file management. Both machines compiled the source code in just under 25 seconds, but the Tandy shaved 17 seconds off the President's 77-second link time; linkage is notoriously disk speed limited. The object program execution time was substantially the same for both machines, indicating that both are running an 8088 at the standard clock rate of 4.77 MHz.

The Software Bundle

Bundled with the Tandy 1000 is Deskmate, a Tandy product designed to provide desktop utilities. This is a relatively simple package, and should not present a problem to first-time computer buyers. However, the more experienced will probably be unimpressed with Deskmate.

Deskmate's standard menu displays the calendar for the current month, timed events for today, and a file directory subdivided by application. From this menu one can access the various subfunctions by using the arrow and Enter keys. ▶

As supplied, the system is configured for monochrome screens, but the user can modify the colours with a combination of the control and function keys. If the keyboard is not touched for 10 minutes, the screen contents disappear, and the Deskmate logo scrolls across the screen to prevent image burn-in. Pressing any key restores the previous screen in a manner reminiscent of the Hyperion's protection system.

There is a half-hearted attempt to integrate the various functions. For example, one can access a primitive calculator while within the text editor. Don't expect anything as sophisticated at Sidekick here. There is no windowing, and all screen input/output seems to be performed with standard DOS calls, rather than by writing directly to RAM. There are slots on the keyboard just above the function keys. These are presumably designed to accept legends to suit the various systems, but no such legend cards were included with the machine. This is a pity, because the function keys are used heavily by Deskmate.

The Filer system is a simple database application. If an autodial modem is attached, you can invoke the Call function for a particular phone number from within the Filer. Again, Sidekick does a better job. The Filer will never replace dBase! Nor will the Worksheet deal Lotus a death blow. A mere 17 pages of the manual are devoted to this spreadsheet system.

All manufacturers of PC compatibles need to tailor their BASIC interpreter offering, since the Real Thing uses some of its ROM BASIC. Most seem to get it right first time — but not Tandy. A short note to this effect is included with the system. Briefly, it indicates the following items have not yet been implemented:

- Multiple video pages for graphics modes
- Lightpen statements and functions
- Tiling option for PAINT
- The external speaker and BEEP ON/OFF

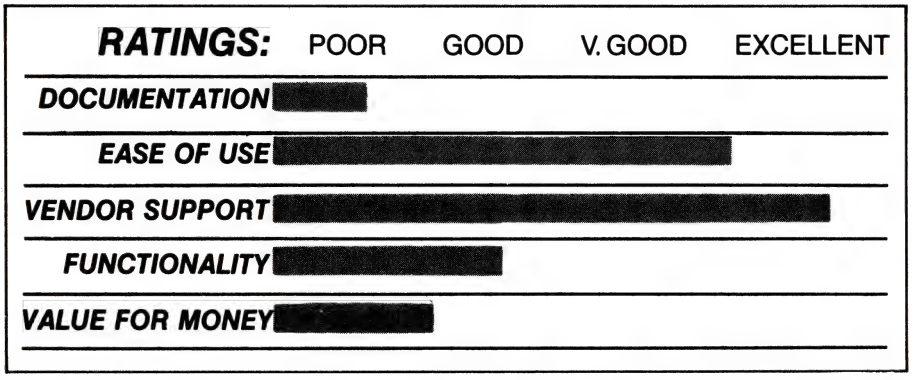
I also noticed the CLS statement does not clear the 25th row, even if KEY OFF has been executed. On the other hand, I did get some results from the NOISE statement.

The Filer will never replace dBase — nor will the Worksheet deal Lotus a death blow.

Pricing

The basic machine without any monitor retails for $1999. This gives you a single floppy disk drive and 128 Kbytes of RAM. A monochrome monitor will bump that up by $349.95, while the RGB monitor costs $899. To buy a basic system with an additional floppy disk drive and another 128 Kbytes of RAM will add another $1000. A printer cable (edge connector to Centronics parallel) costs $59.95 for six feet. If you have the urge to add 15 Mbytes of hard disk, then set aside $549.95 for the controller board, $3499 for the drive itself, and roughly $50 for installation. If you install it yourself, be prepared to void your warranty.

While competitive with IBM's price structure, these prices are above what most clone-buyers would normally have to pay. Frankly, I am unimpressed. □



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FIBONACCI	*0:53.49*	*1:49.74*
30X30 MATRIX (8087)	*0:08.84*	*0:19.28*
FP OPERATIONS	*0:52.12*	*0:31.75*
FP OPERATIONS (8087)	*0:01.97*	*0:06.21*
SYNTAX CHECKING EDITOR	*YES*	*NO*
MULTIPLE WINDOW EDITING	*YES*	*NO*
EDITOR FILESIZE LIMIT	*MEMORY SIZE*	*64K*
COMPILE ERROR CALLS EDITOR	*YES*	*YES*
LINKER	*YES*	*NO*
PRODUCES .EXE FILES	*YES*	*NO*
EXECUTABLE CODE SIZE LIMIT	*DISK SPACE*	*64K*
DOS ACCESS FROM EDITOR	*YES*	*NO*
DOS ACCESS FROM PROGRAMS	*YES*	*LIMITED*
8087 SUPPORT STANDARD	*YES*	*NO*
COPY-PROTECTED DISK	*NO*	*NO*
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INTERFACE TECHNOLOGIES

Source: Software Resources, Inc.
Sieve program from BYTE, January 1983.
Fibonacci program from Dr. Dobb's Journal, February 1985.
Matrix program from BYTE, October, 1982.
FP Operations program from BYTE, May 1985.
Turbo Pascal without 8087 uses only 6-byte accuracy for type REAL; M2SDS with or without 8087 uses 8-byte accuracy.
Programs compiled with all checking options on.
All tests conducted on a standard IBM-PC/XT with 512K of memory and an 8087 math coprocessor.

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A WORKING BEE

BY JAN ROBERTS

Jan Roberts wanted the kind of computer most self-employed and small business people are looking for — powerful but cheap. She found the closest thing to her dream machine in the 128 Kbyte Microbee, which even comes complete with enough general-purpose software to satisfy most needs.

I WAS ADVISED by friends to get an IBM compatible, but my pocket wouldn't stretch as far as their price a year ago. Personally, I would have loved a Lisa, but that too was only a dream. So, after looking at a range of models including Kaypro, Sanyo, Osborne, Dot and Apple-compatibles, I settled for what was the cheapest of the business machines I saw, the top-of-the-Microbee-range 128 Kbyte Small Business Computer.

I've had my machine now for nine months, and am delighted with my choice; it has turned out to be a friendly, useful and economical machine. I'm a professional writer and film-maker, and wanted a machine I could drive hard and fast with standard business word processing and spreadsheet programs. It had to be friendly — I wasn't prepared to master esoteric code.

The Microbee has a most useful and easy to use shell program which, coupled with a disk drive, gives it exceptional speed and versatility. But more about these in a moment. The most important quality in any machine is reliability.

I've driven my machine extremely hard; it is commonly on for 12 hours a day. In the last six months it has displayed only one minor fault: the timing went out by a single microsecond during the hot weather in February and it took ages to save my Wordstar files. I phoned Applied Technology's Melbourne shop and was told to bring it in right away. Ten minutes after walking into the shop I had it back fixed, without a charge.

This is not to say I didn't have a few initial bugs. The temporary single-drive machine I purchased in order to short-cut the queue for dual drives proved within hours to have serious bugs. AT happily agreed to swap it for a dual drive, but this too developed faults immediately. It seems I was a victim of AT's short-lived excursion into having some machines manufactured in Asia.

In I strode to the Melbourne shop, raging by now, and out I went with yet another replacement machine — this time one manufactured in Applied Technology's Gosford plant outside Sydney. Fortunately, all this was within the warranty period and free of charge, and since then everything has gone very well.

The Beast Revealed

Now, let me tell you about the machine.

I only began to really appreciate the Microbee's marvellous shell program when I used friends' more standard CP/M machines, including Kaypros and Portapaks.

On putting a disk into the machine's A: drive, it boots to a display of contents with a series of icons along the foot of the screen. Programs can be run from this by merely typing the icon's corresponding number. In summary, '1' indicates Wordstar, '2' is Multiplan and '3' is Microworld BASIC (a BASIC expanded to handle graphics, sound and colour). Number '4' is for redefining the numbers to set up a menu of your choice, '5' is initialising and configuring, '6' is telecommunications, '7' file management, '8' is delete, '9' is help and '0' is for returning to normal CP/M.

Software supplied with the machine includes Wordstar, with Mailmerge and Spellstar, Multiplan, Microsoft and Microworld BASIC, Telcom, Wordbee and CP/M — both the 2.2 version and the upgraded ZCPR2 — as well as many other utilities. I have added to this much free public domain software — the advantage of a machine that takes standard CP/M.

It is also easy to reconfigure the disks so they auto-boot to programs of your choice, including the user-defined menu or Wordstar. These programs can be on any of the drives.

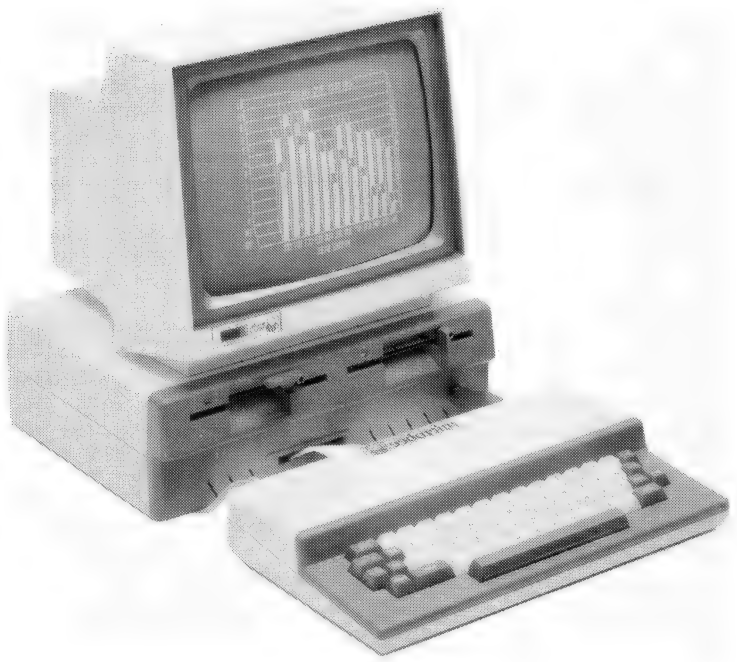
Using the Icons

The first four icons (to access Wordstar, Multiplan, BASIC and to redefine the main menu) are fairly self-explanatory; the fifth, which gets you into the initialising and configuring program, is again menu-driven. Disks can be initialised in either drive and have operating system programs copied onto them in the one operation. One disk after another can be initialised identically with minimal work. I have also used this utility to place the operating systems on disks that are already initialised, as it's possible to use its copying facilities without initialising. If initialising, it warns if a disk already contains data.

This program also contains menus allowing selection of colours, screen positioning, printer configuration, serial port baud rates, and one of four drives. All choices are made simply by pressing a number key.

The telecommunications program (accessed via '6', a little telephone icon) can be used with ease to access various bulletin boards, and also allows the installation of a remote keyboard; I've had my Microbee operating via a Brother electronic typewriter. As well as this, it allows the Microbee to be used as a remote terminal for another computer. The telecommunications facility comes with a built-in expandable telephone number list and full documentation.

In a way this program is *too* good, allowing for facilities like automatic dialling and automatic log-on. The documentation explains that all you have to do is type DIAL plus a number and the program will dial it for you repeatedly until you get through. ▶



Otherwise DIAL plus a name, say TARDIS, will have the program find the number of this bulletin board and dial it, performing full log-on procedures automatically. The hitch is that these facilities are only supported by a so-called 'Advanced Beemodem', which is so newly released I haven't yet had the opportunity to use one.

Incidentally, the Beemodem's bracket, as has been noted in other reviews, is obviously designed in such a way that it is best used standing on its end, otherwise the handset just doesn't sit properly. I have solved this most satisfactorily by mounting the bracket vertically on the side of my desk.

More Iconography

To return to those icons: pressing '7' brings up the file management menu. The icon display is replaced by a series of options: copy, rename, display and print, all of which are again selected by pressing a number. You indicate the file you wish to operate on either by typing in its name or by moving the cursor around using the Wordstar cursor keys, which lights up file names in reverse video. Any number of files can be selected, and files may be simultaneously selected by typing in a wildcard such as *.com.

Once files are selected, another series of options is available. Displays can be paginated, control characters can be shown, copying can be interactive or with forced overwrite, and so on; all these options can be set to your standard choice. The only missing option is verification of copies; perhaps this is done automatically? It would be nice to know, although I'm not aware of ever having a faulty transfer made under this program.

This brings me to the eighth option on the main menu, a little dustbin, which stands for Erase. In operation, each file must be individually selected — either by using the cursor or by typing in the name — and then the choice has to be verified. This has proved a little too cautious for me — I normally use it by typing in wildcards such as *.doc, which deletes all document files, although still only after individual verification.

The shell actually incorporates a more advanced form of CP/M with many of the features of CP/M 3, namely ZCPR2; hence the interactive erase command. This took me some time to work out as the Microbee manuals don't mention it!

If I don't wish to be at all cautious, I can use the basic CP/M command ERA from the shell. If you type anything but numbers at the main menu stage, the icons vanish and are replaced a blank command line. You can enter anything into this space by placing the cursor over it on the menu and pressing Linefeed. ERA can then be typed and the files selected, again using Linefeed.

There is no way I would be without this friendly shell now; I pity my friends struggling with their esoteric CP/M commands.

The ninth icon calls up a series of help menus with instructions for the use of icons and of many CP/M commands — all fully menu-driven. One useful feature here is that the final help menu can be altered or added to; instructions are supplied with the relevant program, MAININDEX.

Finally, 0 calls up CP/M and banishes the shell from sight. One new CP/M command is SH or SHELL, which brings you back to the shell.

Odds and Ends ...

Another piece of information not mentioned in the supplied manuals is the upgrade of Microbee's own BASIC to allow it the same facility as Microsoft's of being able to call up a BASIC program by simply typing in two words — BASIC plus the filename. This is typed into the space occupied by the icons, or, more simply, by selecting BASIC and then the filename by using the cursor keys and Linefeed.

I've heard from hackers that there are some disadvantages in the way the 128 Kbyte Microbee's memory is organised. I've only found this a problem when I've tried to run Submit, X-sub or Qwikkey: they just don't work. (However, Asub is a substitute for Submit.) I also have problems with some games written for earlier Microbees, but consider this a very small price to pay for an otherwise extremely useful machine.

There is no way I would be without this friendly shell now; I pity my friends struggling with their esoteric CP/M commands. I guess if I'd had the money for a Macintosh or Lisa, I'd feel much the same about them — but I didn't have the money. The Mac costs twice as much as my Bee — and doesn't come with dual disk drives or all the software I need.

Memories, Memories ...

I haven't yet described one extra glorious feature: the built-in memory drive and logical drive facilities hidden deceitfully away in the standard Microbee case. My Microbee toggles from contents-screen to contents-screen by pressing either control-R or control-C. Apart from providing the easiest way I know of telling the machine I've swapped a disk, it also makes selection of files for transfer remarkably easy.

The drives toggle from A: to B: and then ▶

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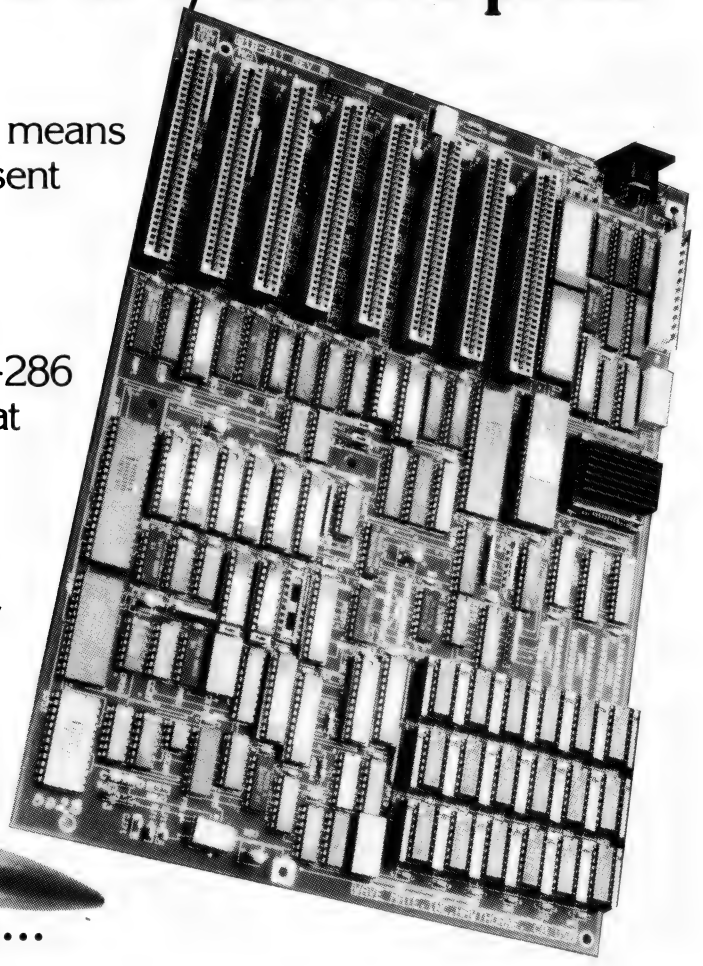

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to M:, which is the Bee's memory drive or RAM disk — 62 Kbytes of internal memory that can be loaded from a disk to provide ultra-fast operation. I commonly put into it the Wordstar file I'm using (as long as it isn't more than 30 Kbytes — Wordstar uses the rest of the space to create .BAK copies). On occasion I store both Microsoft and Microworld BASIC in the M: drive to provide ultra-fast toggling from one to the other. When used like this, or for Wordstar or Multiplan files, it speeds up the operation of programs enormously. It's particularly wonderful to use with Wordstar; you can write to memory in an instant and cut out much tedious disk accessing.

The main limitation of this memory drive is that it's wiped clean when the power is switched off; sometimes I miss the CMOS chips in my old 32 Kbyte Microbee. My dream machine would have a *large* memory drive with battery backup and automatic backing-up to disk.

The drives toggle on past M: to where the L: (or logical) drive is situated. This facility allows two disks to be used alternately in the A: slot in order to copy files if you have a single-drive machine. For me it has two uses: first, if I'm in Wordstar and have a system disk in drive A: and a working file disk in drive B: but want to copy a file on a different disk, I just tell Wordstar the file I want to copy is L: filename. The machine tells me to put the appropriate disk in the A: drive, and then prompts for the system disk when it needs it again. The second obvious use is making copies onto a backup disk.

The memory drive also provides an invaluable disk caching system. The part of the drive you are not using is used automatically to store information that would otherwise have to be called from disk. According to Applied Technology, this speeds up the operation of programs by about 50 per cent, and means that although the Z80 runs at a steady 3.275 MHz, the programs nip along at a very smart speed. I've had scientist friends remark on how much faster my machine moves than their IBMs, and I've also tried using the Portapak with its 6 MHz processor, but to me it seemed noticeably slower. Certainly my Bee boots three times faster than a friend's Portapak, despite costing half that machine's price.

One facility I would very much like, as would most other Microbee users, is to be able to run 16-bit programs; I know Applied Tech is working on this.

More Goodies

The 128 Kbyte Microbee comes with some other goodies too — like being able to read and write Kaypro, Osborne and IBM disks. Its own disk format allows the storage of nearly 400 Kbytes per disk, and the use of virtual memory methods helps to expand the otherwise limited RAM memory.

There is now an option to expand this model by fitting a 10 Mbyte hard disk drive in place of one of the existing drives. I believe this too works within the shell program, though I haven't had the chance to use it myself.

The Microbee comes in its standard case with programmable parallel port and RS232 serial port, and with cassette interface. The parallel port is not quite a standard Centronics and demands a special adaptor that is located within the plug on the optional cable (cable and adaptor cost about $50).

The display is good and firm, and the resolution at 512 by 256 pixels provides me with a clear, sharp, amber image. The screen format is a standard 80 characters by 24 lines, or 64 by 16 in Microworld BASIC.

Just a Few Complaints

Of course, the 128 Kbyte Microbee does have some limitations. It occasionally has a slight screen display waver — when it's been on for, say, 12 hours. Turning if off while I have a cup of coffee usually gives it enough rest. A small adjustment is probably needed.

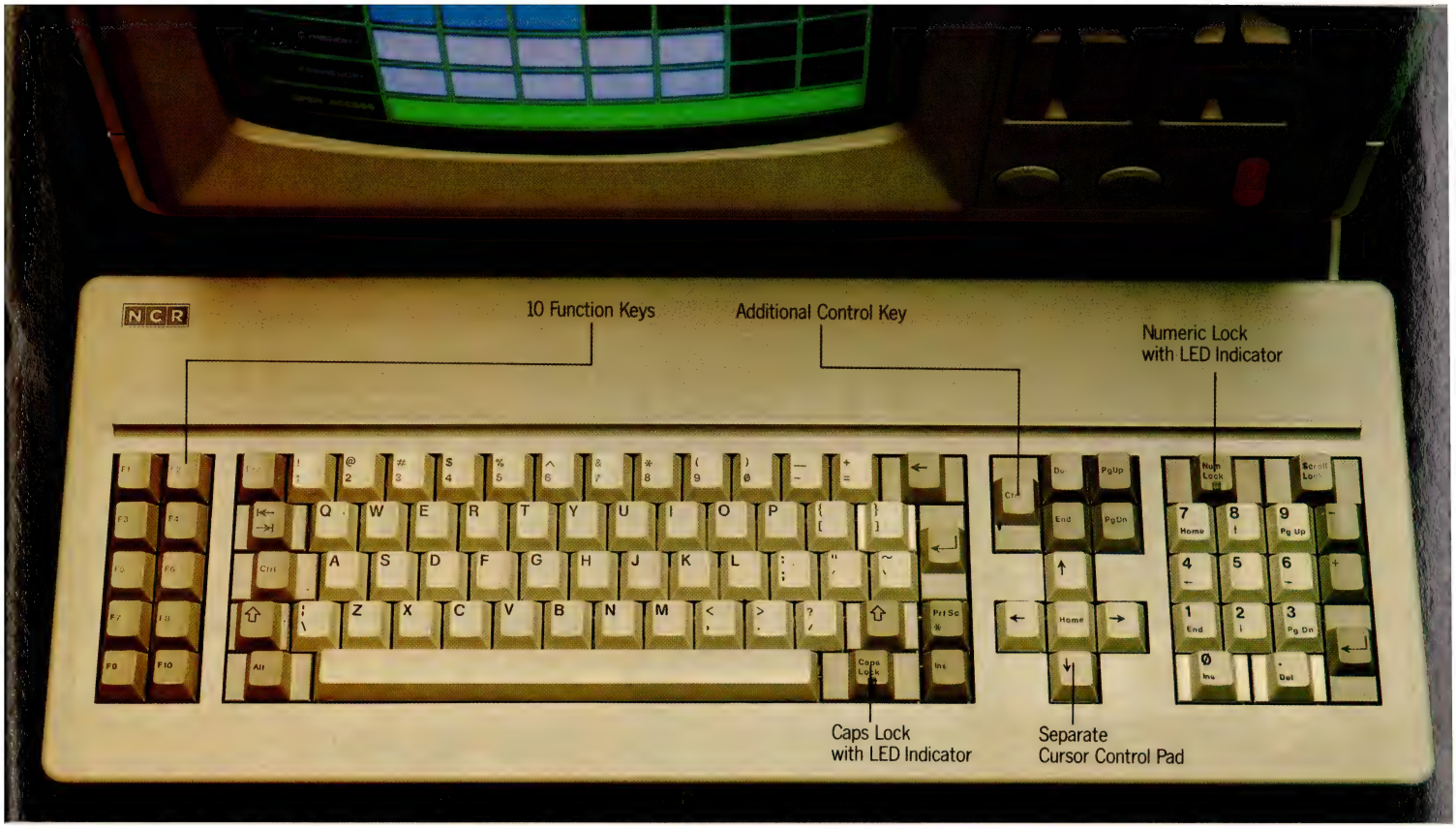
I would prefer an expanded keyboard, although my children say they prefer the current one (which has the new, more reliable key switches to which Applied Technology changed last year) to those on the BBCs at their school. But I eye with envy the facilities on some other keyboards, such as a programmable numeric keypad, cursor keys and a screen-dump key. I've heard a rumour that Applied Technology has a new keyboard nearly ready; I don't know if it has all these facilities, but if it does I'll want to upgrade to it — so I hope it keeps its policy of having all machines upgradable to the next.

The other thing I would very much like, as would most other Microbee users, is to be able to run 16-bit programs; I know Applied Tech is working on this. My preference would be a machine which could toggle between 8-bit and 16-bit operation, with a handsome extra chunk of RAM that could be used for 16-bit programs or as an expanded memory drive. I've seen adverts offering this as a powerful add-on, but I've also heard strong rumours that AT is preparing such a machine — and a 32-bit as well — so perhaps I'll wait to see what it comes up with. The rumour is that it should be out within a year ('real soon now'?) — but there again it might not be. Who knows what snags may come up?

The final item on my wish list is a portable with a good large screen. I've heard Applied Technology has received a government grant to work on such screens, and if it came up with an expanded-keyboard portable running both 8-bit and 16-bit programs — and if the 16-bit had a high degree of IBM compatibility — I'm sure it would be a winner. In any case, I'm sure other companies will be producing such machines, but until they do so at a reasonable price, I'll stick with my 128 Kbyte Microbee as by far the best 8-bit machine around that combines friendliness with economy.

Prices

Applied Technology supplies the 128 Kbyte Microbee for $1995 including a green-screen monitor, with Wordstar, Mailmerge, Spellstar, Multiplan and other software included. For $400 extra you can have an amber monitor and a 100 cps dot matrix printer with the machine. Also available is a daisywheel printer running at 18 cps using standard Diablo wheels, for an extraordinarily cheap $459 including cable and tax. □



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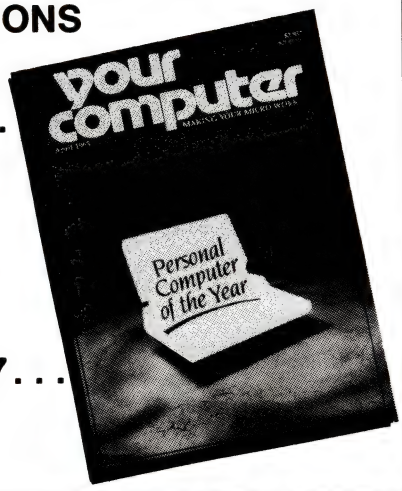

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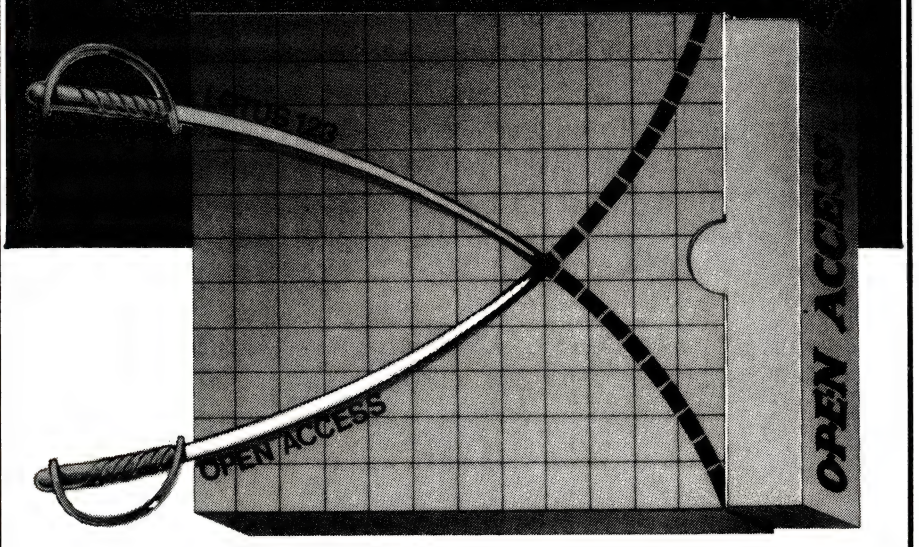

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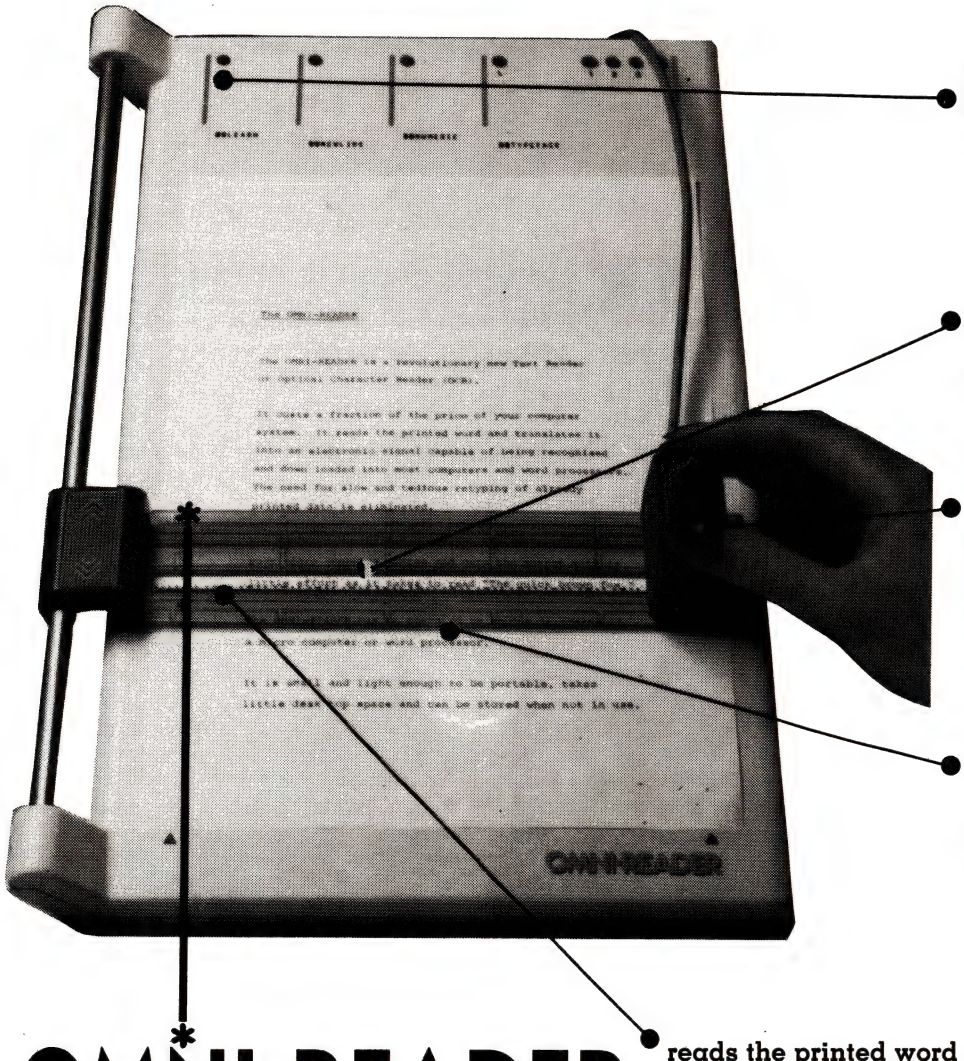

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ALL THIS AND MODULA-2!

Computer scientist David Moore wrote the first full implementation of Modula-2 for the Z80 running under CP/M. Here he explains the workings of Modula-2 itself.

MODULA-2 WAS designed by Niklaus Wirth (pronounced Veert), the same man who designed Pascal. However, Modula-2 is *not* just 'Pascal over-extended' — it's a new language in its own right.

When Wirth designed Pascal he wanted to produce a language which was suitable for beginner computing students. Such a language had to be simple to learn, but also had to be able to support the sophisticated algorithms the students would study in later courses.

Professor Wirth had been a part of the effort to define Algol-68, which is the successor to Algol-60. He had become disillusioned with the complexity of this language, and decided to show that a simple language could also be powerful.

The motivation for Modula-2 is quite different — it's intended to be a systems programming language.

An operating system is a large program; it would be impossible to write such a program as one long piece of code, as is required by standard Pascal. It would take forever to edit and compile, and only one person could work on it at a time; one hundred man years' effort would take one hundred years to complete!

So a better approach is needed. It must be possible to divide the task into modules so that several modules can be written by different programmers in parallel.

It must also be possible for each programmer to specify exactly what he or she is writing — and how to call it — even before he or she writes the code. Otherwise, you couldn't write a module until all the modules it called were completed.

Modula-2 allows just this. Programs are divided into modules. Each module has two parts: a definition module and an implementation module. The definition module tells the outside world what the module does, and how to access it; the implementation module actually does the work.

Suppose you and your friends were working together to write a program. The first thing you'd do would be to break the program into logical pieces and give each programmer one or more of them.

For example, say you're writing a flight simulator. One obvious way to break the program up is:

Controls module: Bill
Speed, position and attitude module: Les
Instrument display module: You
Scenery display module: Linda

You have to write an instrument display module, but the values you need to display (like airspeed and altitude) are all part of the position, speed and attitude module. Before Les leaves the room he has to write a definition module for his module, which could look something like this:

```
DEFINITION MODULE SPAM;

(*   Speed Position Attitude Module *)

VAR  Altitude,Northing,Easting:INTEGER; (*in metres*)
     Bank,Direction,DescentAngle:CARDINAL;   (*radians*1024*)
     Speed:CARDINAL;                         (*metres/second*)

END SPAM.
```

This definition module contains a list of all the elements of Les's modules which you can 'see' from your module. There'll be other objects you can't see. For example, when Les gets home and starts thinking about how to write his part of the program, he'll decide he needs a variable which gives the angle of attack of the wing so he can calculate the amount of lift.

Because this variable (say, 'AngleofAttack') isn't in the definition module it isn't 'visible'. If later during testing the variable is found to contain the wrong value, Les knows he only has to examine his code for the error; no-one else in the group can change the variable.

Just as importantly, if he wants to change the way the value is represented (such as changing the units used), he knows it can't affect the operation of any other module.

When you write your module you'll import the items you want to use. Your module might start like this:

MODULE Instruments; FROM Position IMPORT Altitude,Bank,Descent angle-,Direction, Speed;

These are the items you want to use. You haven't imported the Easting and Northing variables because you don't need to display the plane's current position on the instruments. Notice that Linda will need those variables to determine what can be seen through the window; she'll import those variables, but not some of the others.

You don't need to redefine your imported objects — their definitions are retrieved automatically by giving the name of the module and of the required object.

The fact that the original definition is accessed by your module means you can't inadvertently give a wrong declaration. In other languages, this problem can be reduced by using 'include' files, although this doesn't prevent you from changing an include file and forgetting to recompile all the modules which use it.

With Modula-2, when you link your modules together to form a completed program the linker will check all the modules are up-to-date. This prevents you from accidentally linking in a module compiled with an old version of a definition module which may not agree with the current definition of the module.

Standard Modules

Every Modula-2 compiler comes with a set of standard modules to perform useful functions. You'll receive modules to perform file and terminal input/output and storage management, at the very least. Most compilers also come with other pre-

defined modules.

In a good compiler, you'll receive these modules in source code so you can modify them for your own requirements and use them to develop different modules.

These modules make it very easy to write quite sophisticated programs. Let's look at an example.

I often want to compare two disks to determine what files they have in common. For example, if you're making up a disk to send to a friend (or a customer!), it's very useful to be able to check that no files have been left off the distribution disk.

Listing 1 is a Modula-2 program to do this. It reads the directories of both disks, sorts the filenames into alphabetical order and prints them in two columns with matching filenames printed next to each other. For example:

```
A>CompDir a:*.mod b:*.mod

CAT.MOD
                COMPDIR.MOD
LIST.MOD        LIST.MOD
XERA.MOD
A>_
```

The program takes the form of a module. Because the module doesn't have any symbols which can be used by other modules, it's not divided into separate definition and implementation parts. Unlike most other languages, Modula-2 doesn't have a unique 'main program' part. Rather, every module may contain statements which are to be executed when the program is loaded.

The only rule is that if module A imports module B, module B will be initialised first. Thus, in the case of our program, we know all the modules it imports are ready to go when its 'mainline' executes.

At the beginning of the program, there's a list of 'import' statements. For example:

FROM Command IMPORT Parameter, Parclass, GetParams;

'Command' is the name of a standard module which comes with my compiler. It interprets the command line used to call the program. 'Parameter' and 'Parclass' are types, while 'GetParams' is the procedure which is called to perform the parsing.

These 'import' statements are followed by a number of declarations which look very much like declarations in Pascal. Notice the imported types can be used in exactly the same way they would be if defined locally.

Of the procedure definitions which ▶

```
 1: MODULE CompDir;
 2:
 3: (*       Compare two directories
 4:
 5:          Call is COMPDIR   wild card,wild card
 6:
 7:          Where each wild card produces one of the lists to compare
 8:
 9:          For example, to compare two discs, do: COMPDIR a:*.* b:*.*
10:
11:         *)
12:
13: FROM     SYSTEM          IMPORT ADDRESS,ADR,TSIZE;
14: FROM     Command         IMPORT Parameter,Parclass,GetParams;
15: FROM     Terminal        IMPORT WriteString,WriteLn;
16: FROM     Sort            IMPORT SortRecords;
17: FROM     Files           IMPORT FileName;
18: FROM     GetFiles        IMPORT GetNames;
19:
20: CONST    MaxFiles=256;   (*max files to be matched*)
21:
22: TYPE     PFileName=POINTER TO FileName;
23:          FileArray=ARRAY[1..MaxFiles] OF FileName;
24: VAR
25:          Param:ARRAY[1..2] OF Parameter;          (*area for command li
26:          Count:INTEGER;                           (*parameters*)
27:
28:          LeftNames,RightNames:FileArray;
29:          LeftNameCount,RightNameCount:INTEGER;
30:
31: PROCEDURE Compar(a,b:ADDRESS):BOOLEAN;
32:
33: (*       key comparison routine for the sort module*)
34:
35: VAR      p,q:PFileName;
36: BEGIN
37:          p:=PFileName(a);
38:          q:=PFileName(b);
39:          RETURN p^>q^
40:          END Compar;
41:
42: PROCEDURE ExpandNames(Param:Parameter;VAR Names:FileArray;
43:                       VAR NameCount:INTEGER);
44:
45: (*       Expand wild card file name into list of files
46:          and sort result *)
47: VAR      i,j:INTEGER;
48: BEGIN
49:          GetNames(Param^.Chars,Names,NameCount);
50:
51:          (* remove drive designators, if present
52:             by moving names to places left *)
53:
54:          IF Names[1][1]=':' THEN
55:                  FOR i:=1 TO NameCount DO
56:                          FOR j:=0 TO HIGH(Names[i])-2 DO
57:                                  Names[i][j]:=Names[i][j+2];
58:                                  END;
59:                          Names[i][HIGH(Names[i])-1]:=' ';
60:                          Names[i][HIGH(Names[i])]:=' ';
61:                          END;
62:                  END;(*IF*)
63:
64:          IF NameCount>1 THEN
65:          SortRecords(ADR(Names),CARDINAL(NameCount),
66:                          TSIZE(FileName),Compar);
67:                  END;
68:
69:
70:          END ExpandNames;
71:
72: PROCEDURE Usage;
73: BEGIN
74:          WriteLn;
75:          WriteString('Usage is:   COMPDIR wild card file name ');
76:          WriteString(',wild card file name');
77:          WriteLn;
78:          HALT
79:          END Usage;
80:
81: VAR      i,j:INTEGER;
```

Listing 1. *A Modula-2 program which compares the files on two disks, to show which they have in common.*

Listing 1 continued.

```
 82:         BlankFileName:FileName;
 83:
 84: PROCEDURE PrintLeft;
 85: BEGIN
 86:         WriteString(LeftNames[i]);
 87:         WriteLn;
 88:         END PrintLeft;
 89: PROCEDURE PrintRight;
 90: BEGIN
 91:         WriteString(BlankFileName);
 92:         WriteString('  ');
 93:         WriteString(RightNames[j]);
 94:         WriteLn;
 95:         END PrintRight;
 96:
 97: BEGIN
 98:
 99:         FOR i:=0 TO HIGH(BlankFileName) DO
100:                 BlankFileName[i]:=' ';
101:                 END;
102:
103:         GetParams(Param,Count);
104:         IF Count<2 THEN Usage END;
105:
106:         ExpandNames(Param[1],LeftNames,LeftNameCount);
107:         ExpandNames(Param[2],RightNames,RightNameCount);
108:
109:         (*now perform merge pass of two lists*)
110:
111:         i:=1;
112:         j:=1;
113:         WHILE (i<=LeftNameCount) AND (j<=RightNameCount) DO
114:                 IF LeftNames[i]=RightNames[j] THEN
115:
116:                         WriteString(LeftNames[i]);
117:                         WriteString('  ');
118:                         WriteString(RightNames[j]);
119:                         WriteLn;
120:                         INC(i);
121:                         INC(j);
122:
123:                 ELSIF LeftNames[i]<RightNames[j] THEN
124:
125:                         PrintLeft;
126:                         INC(i);
127:
128:                 ELSE (*Leftnames[i]>RightNames[j]*)
129:
130:                         PrintRight;
131:                         INC(j);
132:                         END;(*IF*)
133:                 END;(*WHILE*)
134:
135:         (*process stragglers*)
136:
137:         WHILE i<=LeftNameCount DO
138:                 PrintLeft;
139:                 INC(i);
140:                 END;
141:
142:         WHILE j<=RightNameCount DO
143:                 PrintRight;
144:                 INC(j);
145:                 ED;
146:
147:         END CompDir.
```

Listing 1 - A Directory Comparison Program

come next, two are worth close examination. The first procedure, 'Compar', is a key comparison routine for the supplied sort module. Line 65 of the program contains a call to the sort procedure in the sort module. 'Compar' is one of the parameters in this procedure call. By writing a short key comparison procedure, the sort module can be used to sort any type of data on any collating sequence.

The declaration for this module must exactly match that required by the procedure in the sort module. The parameter must be of type:

TYPE KeyProc=PROCEDURE (ADDRESS,ADDRESS):BOOLEAN;

In Modula-2, procedures have types, and can even be used as the types of variables!

'ADDRESS' is a standard Modula-2 type which is compatible with any pointer type. Because the key comparison routine needs to compare filenames, the parameters are changed to have the type 'PFileName' (Pointer To FileName) before the comparison is performed. This is an example of the 'type breaking' facilities in Modula-2 — you can tell the compiler to treat a variable as a different type for the purposes of an expression.

The second interesting procedure is 'Expandnames'. This calls 'Getnames' to return a list of file names which match a wildcard parameter, removes any leading drive designator and calls 'Sortrecords' to sort the filenames into order.

Finally, the main program at lines 97 to 147 calls 'Getparams' to parse the command line, calls 'Expandnames' to expand each of the wildcard file names into a list of matching filenames, and uses a classical merge algorithm to compare the two files and print the lists side by side.

This program took me no more than two hours to write, because many of the elements I required already existed and could be easily accessed using the module structure of Modula-2. In another language I'd either have spent several hours reinventing the wheel or searching for old programs which used routines like the ones I needed. What's more, because of the strong typing, once a clean compile had been obtained the program ran at the second attempt.

If you do a lot of programming, you probably have modules to perform sorting, command line parsing and wildcard expansion. But how long will it take you to find them? And when you do find them, how much will you need to change them to meet your new requirements?

With Modula-2 you can build up a library of useful modules, and the definition module construct makes finding routines relatively easy. Also, as demonstrated by the use of the 'Sort' module in the sample program, although the language lacks the 'generic' facilities of Ada, it's powerful enough to support re-usable modules.

In conclusion, Modula-2 is the ideal language for writing large programs, especially on small machines for which Ada isn't available. Even on large machines, many experts argue it's still the better language because of its relative simplicity. □

THE NCR PC 4i

A Heavyweight Compatible

THE 'TOY SHOP' in North Sydney is not the place to go looking for a Lego set or Cabbage Patch Doll. But if you're in the market for a Maserati, a Ferrari, a large-scale, remote-controlled helicopter or some other little knick-knack for your favourite executive, it's a good place to start your search.

The latest addition to the Toy Shop's wares is the NCR 4i PC.

The obvious question is why? Why the NCR? There are so many IBM-compatible machines around, at times it's hard to distinguish one from the other. What makes this machine stand out enough to warrant its inclusion on the Toy Shop's exclusive stocklist?

Well, the NCR is not your average compatible. From the first moment I heaved it out of its box, I realised this machine was an individual. It has no pretensions to being a portable, the currently 'in' thing to be. It's not even a transportable. Nor, really, a movable ... it's the sort of PC you'd build your office around — literally.

However, once firmly in its appointed place, the solidity of the machine is attractive. It takes after NEC's original APC in design, with the monitor, drives, CPU, power supply and fan all in the one box. Setting it up is a cinch — plug in the keyboard and power lead and off you go. No tangle of cords to clutter up your desk.

When Rose needed to get away for some solid software reviewing, we thought the NCR would be great for her to work on and evaluate at the same time ... that was before we'd sized it up.

The keyboard is good — for an IBM compatible. Some people swear by the IBM-standard keyboard, but I'm with the band who find it illogical and flimsy. The NCR has all the 'enhanced' features which should be in any standard design — lights to show whether you have caps lock or num lock on; separate, well-spaced cursor and numeric keypads; some redundancy in the keys, so you have a choice of which 'ctrl', 'enter', numeric or editing keys you use; and adjustable legs to let you tilt the keyboard. The touch is adequate.

Looking at the rest of the machine, the 30 cm screen displays 25 lines by 80 columns and — with the optional 64 Kbyte graphics controller on board — has a maximum resolution of 640 by 400 pixels. This, too, is adequate. Anything less than this resolution is just not on for extensive use, and it looks like various government departments, led by the Victorian State Transport Authority, are going to adopt 640 by 400 pixels as the minimum standard. The basic IBM PC will be one of the machines affected by this standard.

To the right of the monitor are the disk drives — either one or two 13 cm floppies and an optional 10 Mbyte Winchester hard disk. Beneath these is an on/off switch and brightness and volume controls, all in sensibly accessible positions. Around the back is an RS232 serial port, a Centronics parallel port and sockets for the keyboard, internal monitor and power leads. ▶

In the Process

The NCR is built around the Intel 8088, the same processor used in the IBM PC. The basic model comes with 256 Kbytes of RAM—a fairly healthy starting point — which can be built up to 640 Kbytes using 64 or 128 Kbyte expansion modules. Five IBM-compatible expansion slots are inside the box. The fan and disks seemed to be a little on the noisy side, although that may be because I'm used to a multi-user system where the rackety bits are kept in a room at the end of the corridor. However, the noise level was not distracting — it was just pleasant when I switched off.

One optional extra really should be included with the standard setup — the monitor 'tilt and swivel mechanism'. Working for long periods of time on computers can cause problems with eye and muscle strain; the easier you can make it on yourself when using a computer the better, and equipment such as adjustable keyboards and monitors should be regarded as basic. With the NCR, it's even more important because it's such a heavy thing to adjust. Trying to put a couple of books under the front of the monitor to change the angle was not a particularly satisfactory operation, so I'd certainly think about investing the extra money needed for the tilt-and-swiveller (while gnashing my teeth at NCR's stinginess in not providing it as standard).

Software included with the NCR 4i is NCR-DOS ('PC-DOS compatible'), GW-BASIC, tutorial software and a RAM-disk utility. As far as I could tell, NCR-DOS is very IBM compatible — everything I threw at it ran perfectly, including Flight Simulator, Lotus and dBase III.

As for the rest of the bundled software, GW-BASIC is like any BASIC (what less can I say?) and the tutorial software treads the fine line between being patronising and instructive. The tutorial falls into two parts — the Instructor and Professor DOS. The Instructor introduces new chums to the NCR PC and microcomputers in general, using a combination of lessons and games. Professor DOS provides an introduction to DOS, including a section on advanced DOS features (such as piping and redirected I/O). The coverage was good, apart from the advanced features, but anyone who is getting into DOS's advanced features should be able to dive into the manuals themselves for more detail.

There is also a HELP utility, which provides information on all the NCR-DOS commands. This program is well-written, easy to use and provides sufficient detail to be very helpful. It's good to be able to check a command while you're still in DOS.

The RAM-disk utility allows you to set aside part of the random access memory as a RAM drive — a volatile, high-speed, memory drive. This drive may be accessed as drive D: and treated as an ordinary drive, except that information you wish to save at the end of a session must be written to floppy or hard disk, as anything in the RAM drive will be lost when you switch off.

This is a nice little utility to get gratis, but you'll need more than the standard 256 Kbytes of RAM to make proper use of it. When I ran the RAM-disk demo, I kept on running out of memory when trying to load most of my other programs, as there was insufficient RAM left when using the default settings. You can customise settings, but the more memory you have for this, the better.

Pressing Keys Will Never Hurt Me ...

Along with the various disk-based tutorials, you get two manuals, three reference cards (one for BASIC, one for DOS and one for the keyboard) and a 'Getting started' booklet. I found the documentation clear and complete. Our office favourite IBM-compatible — the Olivetti M24 — has awful documentation which leaves out all the technical details you find you need at about 2 in the morning. The NCR manuals have enough detail to keep most advanced users happy while providing a welcoming introduction to the new user. I liked how they kept emphasising you couldn't destroy the computer by typing the wrong thing (especially as the installation procedure ensures you make a backup of the System disk and use *only* the backup). I remember during my first encounter with a computer I was terrified of destroying the expensive beast with one bad keystroke.

In the Balance

There are so many IBM-compatibles around it's hard to judge them unless they have very special distinguishing characteristics. The NCR is not a particularly outstanding machine, with its price tag ($4050 for a monochrome monitor and two-floppy system) placing it in the mid-to-upper end of the compatible range.

However, it impressed me as a machine which is solid in all respects — construction, name, compatibility, support, documentation and performance. I coveted it from the start, and if I hadn't ended up with three pulled muscles, a strained tendon and bruising to the upper legs after moving the blasted thing from home to work, my desire would have remained undiminished. □

Machine:	NCR PC 4i
Manufacturer:	NCR Australia, 8 Napier Street, North Sydney 2060; (02) 599 1999.
Standard configuration:	Monochrome monitor and two 360 Kbyte floppy disk drives.
Price:	$4050
Review unit from:	Logo Computer Centre, Suite 305, Henry Lawson Business Centre, Birkenhead Point, Drummoyne 2048; (02) 819 7307.
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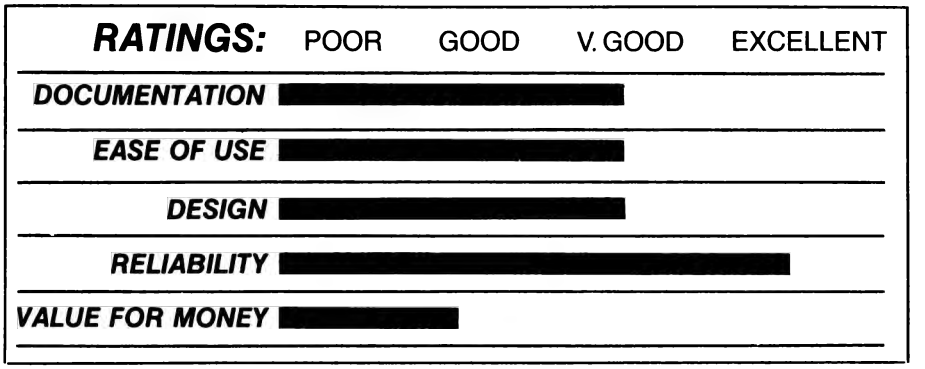

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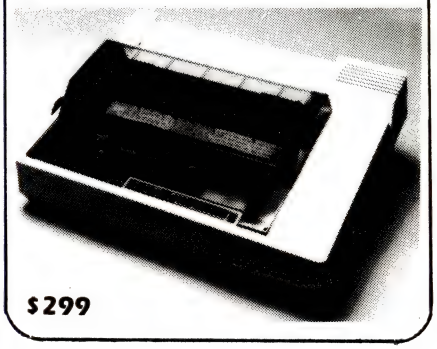

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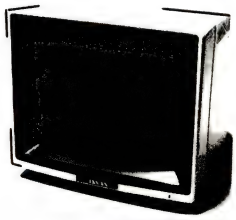

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BY JOHN HEPWORTH

THE KING IS DEAD — LONG LIVE THE KING

Version 2 of Peter Norton's fabulous Norton Utilities is no more; on the throne now is Norton Utilities Version 3. All serious or thoughtful users of IBM PCs and MS-DOS machines now have available what have been called 'power tools for computers'.

THE MAIN claim to fame of the Norton Utilities is their ability to unerase files. Yes, that's right — you can erase a file by accident or design, and under most circumstances get it back again.

How can this be?

Files are not really erased byte-by-byte and character-by-character, but are merely marked within the directory as 'erased'. The information remains where it was on the disk until another file is written over it. Files are marked as erased by changing the first character of the filename to a hex E5 (decimal 229), and are unerased by inserting another character into this first position, and then linking together the various parts of the file.

While unerasing is usually successful, care should be taken. In particular, if you're erasing a floppy, make an exact copy with DISKCOPY first, and try unerasing a copy. With hard disks, insurance in the form of a file-by-file backup before attempting an unerase would be wise. Always make a backup before modifying any file, whether by Norton, Debug or by any of the public domain file modification programs.

Version 2 of the Utilities used a number of programs to unerase files, look at file information and patch files. Different programs were required to look at floppies and hard disks, and the hard disk programs didn't work with many non-IBM hard disks. The whole procedure was somewhat less than user friendly.

Version 3 takes the menu-driven approach to all these activities, with multi-level menus, single-key operation in most instances, and the use of the Escape key to revert to the next-higher menu.

Disk Inspection

One fascinating exercise is to look at file information, as displayed graphically by Norton. One of the options allows information on each file to be inspected, even if they are hidden or system files, and to step through the files in the directory one at a time. The information simultaneously given on screen includes:

- Filename.
- Active file attributes (read-only, archive, system, hidden).
- Date and time of creation fully expanded to a format, such as: Friday, December 21, 1984, 3:00 pm.
- The cluster number and sector number of the starting sector.
- File size in clusters and bytes.
- A graphic map of the disk space showing where the file is located.

The last feature is most interesting when looking at a file which has been repeatedly manipulated, and could be broken up into chunks spread all over the disk. Such non-contiguous files require additional head movement for reading and writing, making these tasks slower. Doing a COPY *.* from the disk with fractured files to a second empty disk will join the fragments of each file into separate, contiguous files. Norton can show the physical arrangement of files on the first disk, confirm the need or otherwise to clean them up, and show the finished result on the second disk.

The starting cluster information is essential before digging into and modifying any file, while knowing which file attributes are active can explain why a file is not seen in a DIR listing, or cannot be written to or erased.

File Modification

Another option is to inspect and/or change the contents of files. The files are displayed in a number of different ways. One gives file contents in ASCII in the right third of the screen, and the equivalent in hex in the left two-thirds. The tab key toggles the cursor from the hex area to ASCII and back again. Modifications are typed straight in, using hex or ASCII, and the altered characters are highlighted on the screen. Once you're happy with the alterations, they are written to the disk, but until then they are only changes in memory.

If you're at all like me, you'll spend hours toying with files and looking into them with Norton to discover their secrets, and the secrets of DOS.

Documentation

At this point I must say Peter is not only a gifted programmer, but a great author of technical books. His text, *Inside the* IBM PC, *Access to Advanced Features and Programming*, works hand-in-hand with the Norton Utilities. Written in true laid-back Californian style, it shows how and why DOS operates, and how it is applied to the PC.

Reading through it soon shows what he's doing with the Utilities, and how and why it's done. All texts should be so rich in information, and so relaxed and easy to read.

The documentation with the programs has also been written in this style. It's a 68-page booklet without an index, and as a manual it's just a little too brief and informal. The programs almost run themselves, so it has to rate as okay, but if you want to know why and how the programs work you'll need to buy *Inside the* IBM PC as well.

The Extras

Peter Norton also provides a number of ▶

other programs on the disk which are essential to the serious user, and a couple of teaching gimmicks to show off his skill.

A few details:

DIRSORT: Sorts files into order within directories by name, extension, size, creation date or creation time. The criteria can be mixed and in any order. DIRSORT reads all the directory information, sorts it in RAM, then rewrites it to the disk. It has worked well for me, but Norton has placed a warning on a README file on the disk that some co-resident software, like print spoolers, can cause problems.

DISKTEST: Reads every sector on a disk or a file or both, and confirms if they can be accurately read. A bit of a gimmick.

FILEATTR: Changes the read-only and archive bits in the file attribute byte. Can be invoked from DOS or from batch files, and recognises wildcard characters like * and ? in filenames. Allows files to be protected from accidental overwrite or erasure, and allows selection of files for backup. FILEHIDE in Norton Version 2 allowed the system and hidden attributes to be altered as well as the read-only and archive attributes, but only worked for me on floppies.

FILEFIND: Looks through all directories on a disk, and prints to the screen where files may be found. If *.* is the file requested, then all files on the disk are listed one directory at a time. If the command gives the /w switch, a wide listing (like DIR/W) is given, but for all directories on the disk. Output can be directed to a printer or a file by using the DOS redirection facilities. Fantastic, and fully recommended.

LISTDIR: Lists all directories and subdirectories on a disk. A real improvement over the DOS command TREE.

FILESIZE: Checks and totals file sizes on a disk. If files are to be copied to another disk it can confirm sufficient space exists on the target disk.

LINEPRNT: Of use to all programmers, this routine takes an ASCII file, splits it into pages, gives each page a heading, margin and date, and prints it. If required, it gives a reference number to each line of the printout. Useful for listing any program, and for those without line numbers, like source code for Assembler or Pascal, the reference numbers on the printout can be handy milestones when reading or marking it up.

SCRATR: Modifies screen attributes. The PC allows for each character on the screen to be in normal video, reverse or blinking; colour screens can also have different character, background and border colours. Invoked from a batch file or from DOS, SCRATR is most useful when you want to gain the attention of a user. Just imagine the effect of a blinking or red screen to call attention at the end of an unattended batch file!

FILEFIND looks through all directories on a disk, and prints to the screen where files may be found. Output can be directed to a printer or a file by using the DOS redirection facilities. Fantastic, and fully recommended.

SYSINFO: Just a gimmick, though Norton must have used some of the routines in the more sophisticated programs. It tells you the type of machine being used, memory size, DOS version, ROM date and so on. I don't use it.

TEXTSRCH: Imagine a disk which has a damaged directory, or has been otherwise scrambled. On it is the middle chapter of your novel, and the publisher is breathing down your neck. TEXTSRCH looks through the whole disk and writes anything that looks like text (including Wordstar-type files with the high bit set) to a file on another disk. You will still have to inspect the results and put them back into logical order, but at least most of the material will be recovered. Essential.

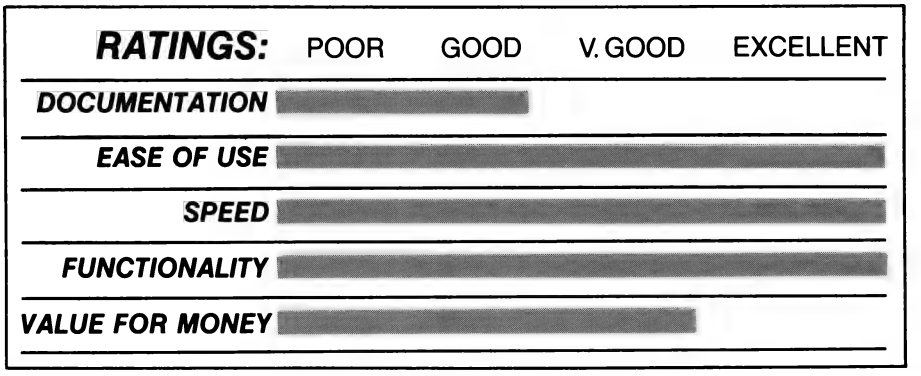
VOLABEL: With DOS 2.00 and later, each disk can have a volume label for identification. This label is shown on screen at the start of each DIR listing. With DOS 2.xx it could only be placed on a disk when formatting. LABEL in Norton Version 2 allowed it to be changed, as does the LABEL which comes with DOS 3.00, and VOLABEL with Version 3. Norton Version 2 LABEL is most convenient, Norton Version 3 VOLABEL is next, while DOS 3.00 LABEL is functional but inconvenient.

WIPEDISK and **WIPEFILE**: These two routines are essential and dangerous. They take a disk and a file and write a character over every byte in the disk or file. This stops any espionage into your confidential information, as could happen if a hard disk was sold and the purchaser used an unerase routine or dug deeper with other disk inspection programs. I don't allow these onto any hard disk, but they are on a floppy for use *very carefully* if required.

Compatibility

Peter Norton claims the rewrite from Version 2 to Version 3 has eliminated compatibility problems, and that the Utilities will now run on almost all MS-DOS and PC-DOS machines; IBM PC/AT, Wang, TI Professional and NEC APC III are specifically mentioned. I haven't tested this aspect, so try it out yourself. With the NEC the disk format may require that the files be transferred from a disk on an IBM to a disk on the NEC via a serial link. Be cautious with DIRSORT, especially if there are co-resident programs on the system, and with UNERASE take out insurance in the form of copying files before attempting to unerase.

If you've noticed I'm impressed by the Utilities you're right. I have all but the WIPE duo on hard disk, and use them at least once a day. The only routines from Norton Utilities Version 2 I still use are FILEHIDE and LABEL. My reaction in one sentence: absolutely essential, □



BIT BUCKET

CLICKON WORKSHEET

Distributor: The Computer Factory, 214 Harbord Road, Brookvale 2100; (02) 938 2156.
Price: $99

It may seem unusual to begin a review of a software package with a justification for buying it in the first place, but as a teacher I wanted a spreadsheet not as a traditional accounting tool but rather as an electronic markbook which could save me time and permit greater flexibility when compiling student reports. My colleagues at school have a healthy scepticism (suspicion?) about the role of computers in education, and I was anxious to see if I had uncovered a further use for computers at school, in addition to their present roles as tools for filing, writing, programming and entertainment.

On a more personal level, it was hard enough justifying the purchase of my $200 'home computer', but the sheer disbelief and astonishment which our purchase of a $-000 'system' (I can never bring myself to state the exact price!) brings to the faces of colleagues and friends has added a touch of urgency to my search for additional uses for the beast. The more applications other than typing and filing I can find for the machine, the sooner my pangs of guilt about having it will depart.

As a teacher, I'm looking for a spreadsheet which can serve as an electronic markbook, is versatile, easily inserted into other documents and inexpensive. **Clickon Worksheet** appears to meet the above criteria. It's not a powerful program, but its 50 rows are sufficient for the largest class and its 20 columns cope with all necessary tests. It's not a purpose-built markbook program, and with the additional 'Clickon Solutions' it may prove useful in other areas. Finally, at $99 it's a lot cheaper than Multiplan.

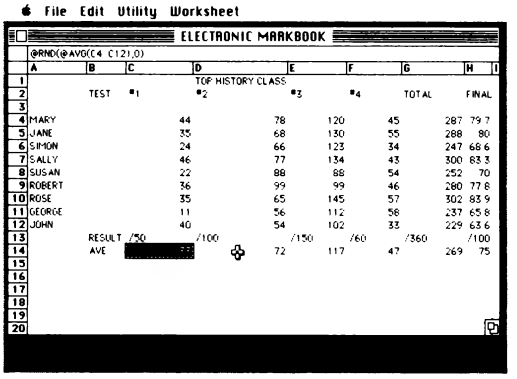
Setting Up

The worksheet is easily and quickly installed onto any number of work disks (disks containing the system folder). It may be used either as an application program or as a desk accessory under the Apple menu. This was a memory-hungry accessory, particularly when graphing calculations, and as the manual warned, too much for my 128 Kbyte Mac to handle. While these occasional crashes haven't corrupted any data, they've meant I usually use the Worksheet by itself and paste any results into a separately created Macwrite document. With the advent of the switcher program for the 'Fat Mac' it may not be necessary to use the program as a desk accessory, even given the extra memory. Still, it's nice to have the option.

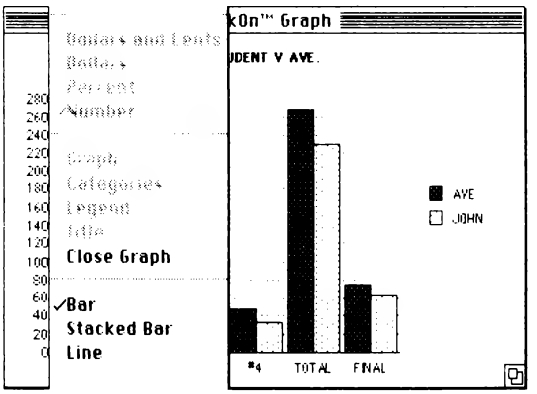
Entering Data

Once the tutorial has been mastered, data entry is a fairly simple process, conducted from the program's explanatory booklet rather than on the disk itself. As I was new to spreadsheets, I didn't remember all the commands after my first run through the tutorial, but it was easy to refer back to the specific page in the booklet. Most editing functions were supported, with the exception of 'Undo'.

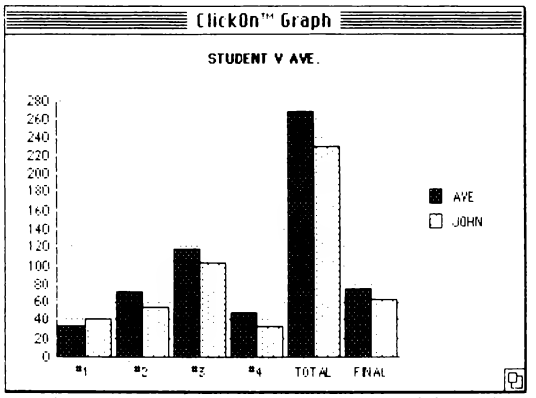
Data in the Worksheet can be manipulated by keyboard as well as with mouse commands, which I found time-saving once I became accustomed to the program (halfway through the first class). Never before have I seen such a variety of cursor shapes and functions; in fact, I'm occasionally unsure where on the page I have to be to get the Double Bar Cross, for example. Nevertheless, most of the graphic representations make sense, like the Folded Page, which is used to fold or unfold the worksheet. All in all, there are seven different shapes for the cursor, depending on what you're trying to do.



A sample markbook 'page'



Menus and windows displaying data in a variety of forms.



Graphing is impressive, but not entirely straightforward.

Functions and Graphs

The Worksheet has 28 financial, mathematical, logical and calendar functions, in addition to the usual mathematical operators — far

more than I required for a marks program, but it's nice to have the power there. I'm still not used to the idea of using a program for a job previously done laboriously with a calculator, so I expect as my proficiency improves some of the functions I don't use now may prove valuable.

Turning a set of figures into an instant graph before my eyes was one of the most impressive examples of computer power I've yet witnessed. At present there appears to be no pressing need for graphing class results, but the situation could change. Also, once away from the security of the tutorial example, I had some difficulty converting data into a graph. However, the 12 ready-made spreadsheet solutions do suggest which of the line, pie, bar or stacked bar graphs is most effective for the given data.

Documentation

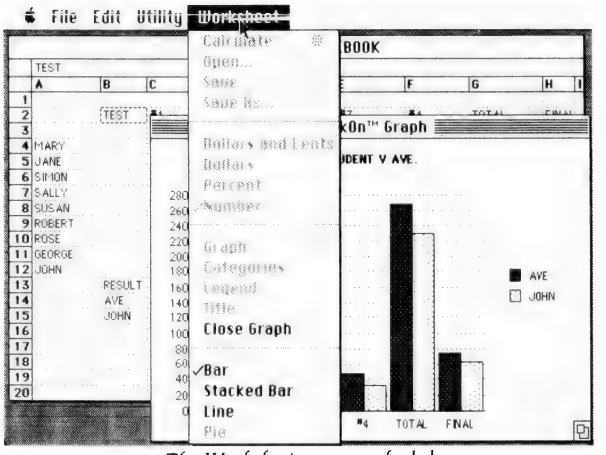
I was satisfied with the 72-page booklet which accompanied the program disk. Ring-binding would be nice, especially when probing the intricacies of "copying the entire worksheet", but for $99 ...

The tutorial and worked examples were easy to follow, but further practice is necessary to become proficient. On-screen help would be useful, but again might add to the cost.

Limitations

As a spreadsheet I only found two limitations, both imposed by the Mac itself. First, it's difficult to view or copy a useful section of the spreadsheet, particularly across the page. Columns 'A' to 'H' are initially visible and the page must be folded for the rest. Second, the 128 Kbyte version of the Mac is unable to take full advantage of some of the best features of the Clickon Worksheet: for example, the ability to switch from a document to a spreadsheet and back again via the Apple menu. These are frustrating limitations of my equipment rather than the fault of the program.

As an electronic markbook, however, I do have reservations. There are at the moment several specific programs written, or in the process of completion, which do a better job. Unnecessary functions are omitted, on-screen help is provided and, most importantly, they are compatible with the two most popular computers in high schools, the Microbee and Apple II. Thus I can dump the class lists I need directly from the administration computer onto my program disk and work at school, which saves on typing and time. I'm not going to trade in my Mac for an old 8-bit machine, but I'm flexible just the same.



The Worksheet menu unfurled.

Of course, Clickon Worksheet doesn't claim to be an electronic markbook, so my criticisms on this front should be taken with a grain of salt.

Summary

In spite of the limitations and problems encountered when trying to adapt Clickon Worksheet to do the job I originally intended, I'm not unhappy with the purchase. As someone who has primarily used the Mac for writing and a little drawing, the complex world of spreadsheets was something of a mystery to me. Now, of the big three applications, only databases remain to be mastered.

Although I found it the most complex and difficult program I've run on the Mac, the Clickon Worksheet really is what it's subtitled: a spreadsheet and graphics desk *accessory* for the Macintosh. Who knows? One day I may even find a real use for it! □

By Rob Vines

MUSIC CONSTRUCTION SET

Distributor: ECP, Unit 3A, 3-9 Kenneth Road, Manly Vale 2093; (02) 949 7300.
Price: $49.95

The first Apple IIs, up to the IIc, were only capable of producing one note at a time from their internal sound system. This limitation was overcome with the release of special plug-in boards. The Apple IIc still has limited polyphonic capabilities, but now even this shortcoming can be economically surmounted, thanks to the release of a program called 'Music Construction Set' (which I'll refer to as MCS).

MCS turns the building blocks of music — notes, rests, sharps, flats and so on — into icons, which you can actually 'grasp' and assemble on your computer screen. Your computer will then play back whatever you've thus 'constructed'.

The first so-called construction set was the 'Pinball Construction Set' (PCS), written by Bill Budge and produced by his company Budge Co. Both PCS and MCS are published by Electronic Arts.

MCS is particularly easy to use. To compose your one-line melody or your multiple-part symphony, you decide which notes you want and where you want them to go (see Figure 1). For example, if you want to move a quaver to the B line of your staff, you just point to the picture of the quaver on the bottom left of the screen (this is called picking it up), and then point to the staff-line where B goes and put your note down. It is now stored in memory.

To move the musical elements into place you can use a joystick, a Koala Pad, an Applemouse II or just the keyboard. The process is relatively simple with any of these input devices, but is more conveniently executed with either the Koala Pad or mouse.

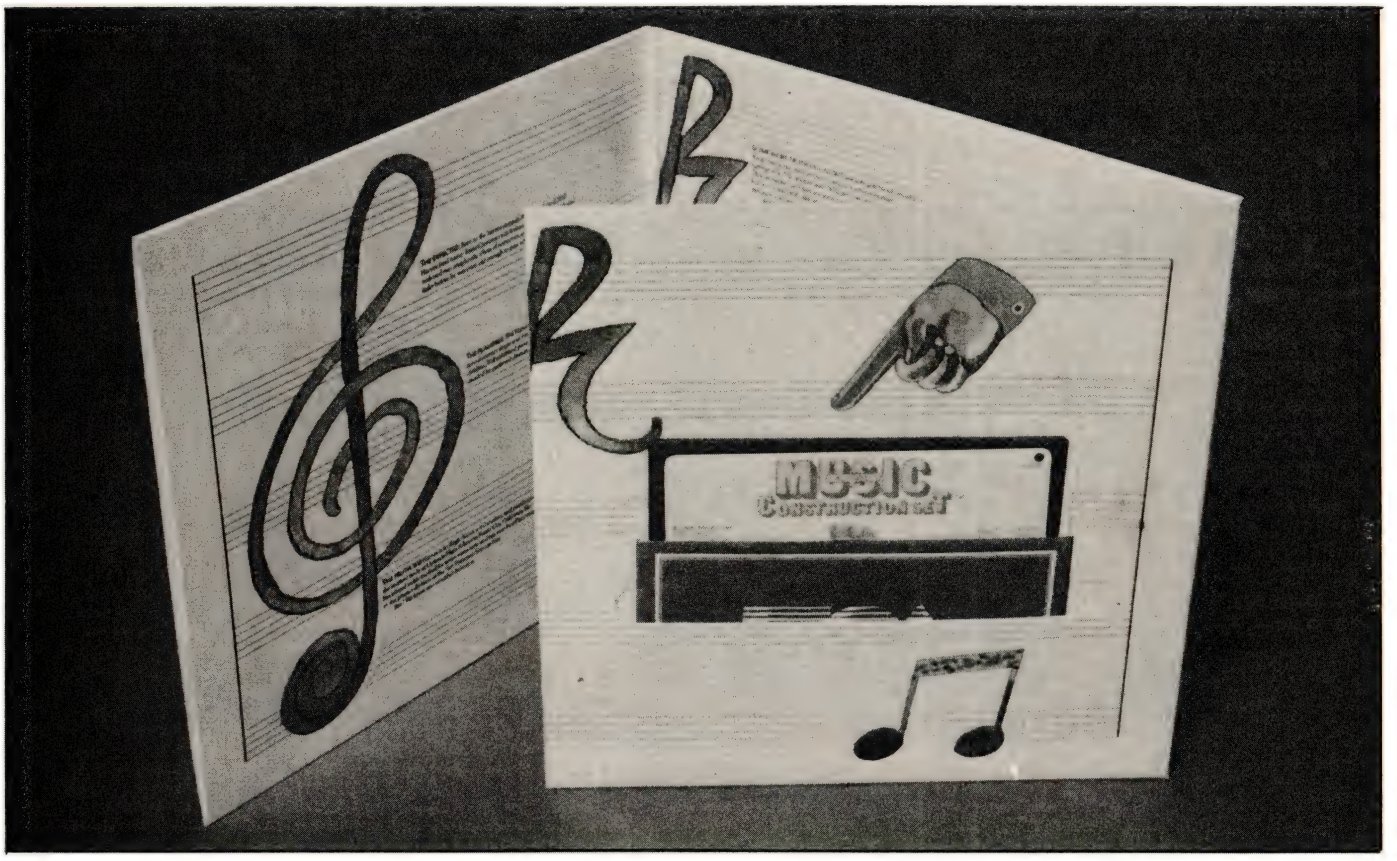
The built-in Apple speaker inside the computer doesn't sound too bad. Hooking up your computer to your hifi system obviously produces better results, as this extends the frequency response and the available volume. On the IIc you use the headphone jack, on the earlier models the cassette port, to complete the external connection.

Both the built-in speaker and the external hifi options allow you to achieve four simultaneous sounds, which the program describes as 'unbelievable voices'. For even better sound one can use a Street Electronics' 'Cricket' (on the IIc) or 'Echo+', or a Sweet Micro Systems' 'Mockingboard' (version C or Sound II on the II, II+ and IIe, and version D on the IIc). These devices allow you to add even more voices; for example, up to six voices in stereo are possible using the Mockingboard.

If you have one of Apple's Imagewriter, DMP or Prowriter printers, or a dot matrix printer from Epson or Okidata, you can produce hard copies of your music. The printing process is, however, very time-consuming, and a pair of staves is printed perpendicular to the top of the page. The author could have improved this program by making it possible to print multiple sets of staves horizontally across the page.

Getting Serious

MCS incorporates a number of special features, one of which is the ability to transpose your music into a different key. This is particularly useful for the serious musician.



The program also allows you to change the volume on each of the two available sound 'channels', and you can even change the speed of the music, or the timbre of the synthetic instruments it is played on. Unfortunately, the variable volume and change of instrument features will not work on the built-in Apple speaker, nor through an external amplifier and its speakers.

One of the limitations of MCS is that if you're using the Apple's internal speaker or a hifi system, it doesn't scroll the music as it is played. Will Harvey, the programmer, couldn't effectively have overcome this, since the deficiency really lies in the computer; if the screen were to scroll, the music itself would be played at a much slower speed. The program does however scroll the music when one of the above-mentioned hardware sound-generating devices is used.

Another deficiency is the program's inability to change the time signature in the middle of a piece. This isn't a problem when using the built-in speaker or your hifi system, but it is when the Mockingboard or other similar devices are used, as the time signature is incorporated to keep scrolling synchronised with the music.

The most serious problem I have experienced with MCS is that a note which is placed immediately to the right of a bar is treated by the program as belonging to the previous bar. You can correct this by putting the note further to the right of the bar.

Unfortunately, you can no longer use your musical pieces in your own BASIC programs, as was possible with an earlier version of MCS when using it in conjunction with a Mockingboard. Previous versions of MCS were only designed to use the built-in Apple speaker, the computer's cassette port or a Mockingboard, and were not configured to use a mouse. Why Harvey eliminated the capability of being able to call up your musical composition from your Applesoft BASIC programs is a mystery; it may have something to do with the non-compatibility of the Mockingboard, Echo+ and Cricket.

It's also a shame you can't use triplets or repeat-dots in your compositions, but there are ways to get around these problems, as described in the MCS manual.

Simple to Use

Using MCS is extremely simple. When you want to look at some music past the left edge of the screen, you press the left-arrow icon and the music scrolls to the left. The same technique is applied when you want to work on music located to the right. To load, save and perform all other disk functions, such as cataloguing, you select the disk icon and then type the appropriate command. To reset input devices, printers and/or sound devices, you select the 'plug' icon. There are no lengthy keyboard commands to hinder your creativity.

The package includes a manual, a reference card and one disk. Since the program is extremely difficult to copy, it would have been worthwhile to include a backup disk. The documentation is brief and easy to read, and the reference card is particularly helpful.

Despite a few problems Music Construction Set is an excellent program, especially when used with one of the optional sound hardware devices such as the Cricket. It's a great way for people who know nothing about music to start learning. □

By Darren Challis

Business

Sensible Solution **100**

Rose got very sensitive about this Great Database Search contender: "Go away, I'm being Sensible", she'd snap; or "I'm going to try to be Sensible all weekend, to see if I can sort this out." It took quite some time before she felt confident with the package, and since Rose is no dummy when it comes to databases, we'd recommend that beginners think twice about choosing this Solution.

Holding FBS Accountable **108**

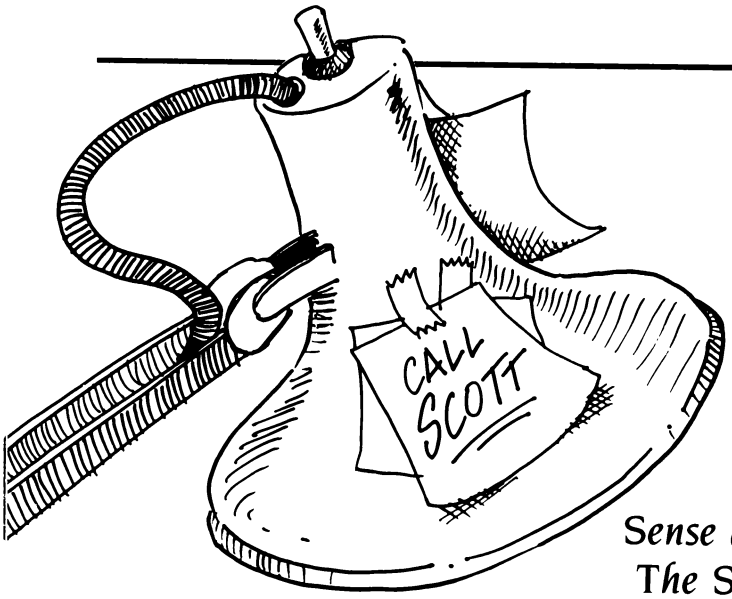
Somewhat ironically, Frank Lee has charged Future Business Systems' accounting software with using out-of-date programming methods, and with being boring. A veteran of the accountancy field, he can't be accused of the common prejudice against 'bean-counters'.

Viatel **113**

This month, Norman really got his hands dirty setting up his very own Viatel connection. An experienced computer user, he found comms a whole new ball game.

Wordstar 2000 — A Leap into the Future? **125**

Still wondering whether you should update from Wordstar to WS 2000? 'Update' isn't quite the word, since there doesn't seem to be a line of original Wordstar code in the newer package. John Nicholls would never have considered buying Wordstar, but he's been happily using its successor for some time.



THE SENSIBLE SOLUTION

Sense and sensibility don't necessarily go together. The Sensible Solution is hot on the scent of some good features for beginners in the database field, but, somewhat senselessly, is otherwise oriented towards experienced programmers who would in turn be incensed by some of the beginner-type constraints the program imposes. Make sense? Let Rose Vines explain some of the sensations she experienced when using this 'Great Database Search' entrant.

GREAT DATABASE SEARCH

WHEN THE Sensible Solution appeared on my desk it was accompanied by a packet of brochures and press releases alternately describing the product as a "database management system", "high-level programming language", "database language for computer professionals" and "programmer's development environment". Opening the manual, I was told The Sensible Solution was not a mere database management system, but a system which is "both a language and a database manager".

Well, O'Hanlon's is free to call its product anything it chooses, but the marketing of The Sensible Solution has placed it in competition with the likes of dBase, Knowledgeman and Dataflex, thus qualifying it for scrutiny in the Great Database Search.

Almost all the large-scale database systems on the market incorporate a programming language, allowing experienced users to develop systems which meet their specific needs. While the language might seem subsidiary to the database, in most cases it's the combination of the two which gives these systems their power and flexibility; anyone who uses dBase, for example, without eventually doing a little programming is wasting a hell of a lot of power.

Where the Sensible Solution differs from many of the other systems around is in its use of a data dictionary, and the 'construction kit' design of its programming language. Another welcome difference is it runs on a wide variety of machines under of a variety of operating systems, including multi-user systems. Some of the systems are: CP/M, CP/M-86, MP/M, MP/M-86, MS-DOS (including network systems), PC-DOS, DPC/OS, Turbo-DOS, MmmOST, n/STAR and CP/NET.

Another good early impression is made by the absence of any copy protection on the program. I can't decide which I hate more - Prolok or Softguard (the two copy protection mechanisms used by different versions of dBase III). With Sensible, the program is restricted to 250 records until you register as a legitimate owner with the distributor, who'll give you a serial number to unlock the program.

First, Build Your Database

Sensible consists of a pile of programs and data files. 'Sensible.EXE' is the executive program which controls the operation of the other parts of the system and the .RUN programs which you develop with the internal programming language. Programs are compiled into 'pseudo-code' executable by the system. The initial menu which appears when you load Sensible is itself a Sensible program (MENU.RUN).

The main menu offers a choice of 10 options:

1. Execute a Sensible Solution Program
2. Data Dictionary Maintenance
3. Screen Painting
4. Source Code Editor
5. Initialise a Data File
6. Compile Source Code
7. Rekey a Data File

8. Restructure a Data File
9.Program Generator
10.Inquire

You can press the appropriate number for the function you wish to perform, or press the ESC key to produce a 'Flash menu' across the bottom of the screen. The flash menu provides you with various options, the only one of much use at this stage being the 'Quit screen' option, which will terminate Sensible Solution and return you to the operating system. The '?(help)' option on the Main Menu doesn't provide any help, which is a bit confusing for first time users. Once you get to know the system, you can modify the MENU.-RUN program to provide help for others if you wish (a good reason to make very sure you never use your original disks for anything other than making backups).

All Sensible's functions can be accessed from operating system level — the menu is merely provided to make the system easier to use for newcomers. For example, you could edit a Sensible source code file by typing SENSCMD <filename> at the system prompt, instead of entering the menu system, choosing option 4 and being prompted for your filename.

Building data files is a four-part operation: defining fields, initialising data and key files, creating a data entry screen and creating a program to control data entry. Sensible offers a variety of ways to do this.

The combination of options 3 and 9 from the main menu provides a semi-automated data file and program generation technique. Entering the screen painter and choosing the screen format option gives you a blank screen to play with. You create your data entry screen by typing text wherever you want it, and then placing your cursor at the position you want a field and pressing ESC. A flash menu will appear, with options allowing you to add, delete or change a field, or list a field's attributes.

Choosing to add a field will put you into another screen with prompts leading you through field definition. Field names can be 15 characters long and *must* be unique. This latter restraint gives you a first taste of what it's like to deal with a system based on a data dictionary; no field name can be duplicated within the one database, so you can't have COMPANY-.NAME in your MAIL file *and* your CUSTOMER file.

There are advantages and disadvantages to this method of organisation. It ensures consistency throughout a system and makes it unnecessary to redefine fields. In contrast, at Federal Publishing we have about a dozen people who create data files in dBase on our system, and there must be at least a dozen different variants on fields such as CONAME, ADDR1, ADDR2 and PCODE (including changes in the field names). A bit of consistency would be welcome. If you add a field during screen painting, and the field already exists in the data dictionary, Sensible will automatically insert the field with the defined characteristics. This database-wide uniformity also makes it possible (perhaps, in fact, imperative) to plan overall system development.

The disadvantages? You could be hard pressed thinking up appropriate field names if you want a number of fields which are slightly different from each other (although, ideally, you should be able to define fields which will be universally useful). It also means record structures and file relationships can become very complex indeed, with data-entry screens regularly accessing information from multiple files.

Because most multi-file access is handled automatically by the system, it's easy to forget about the complexities of your data structures. But it pays to keep a clear idea of your record structure, as Sensible uses a fairly extravagant technique for storing data: records are allocated space in

```
The SENSIBLE SOLUTION      Fields for File: ERRFLE      Use: SYSTEM ERROR FILE          Location: @          Page     1
-------------------------------------------------------------------------------------------------------------------------
Field Name        Field Description                 Type  Size  Dec  Key  Offset  Upper  CR  Default Entry Mask
--------------    ---------------------------------  ----  ----  ---  ---  ------  -----  --  ------------------------
ERRFLE.REC                                           R      8
ERRORCODENUMBER                                      N      3   0    N       1
MESS1                                                A     62               4
MESS2                                                A     62              66

The SENSIBLE SOLUTION      Fields for File: CONTRIBS    Use: CONTRIBUTOR'S MASTER        Location: C          Page     1
-------------------------------------------------------------------------------------------------------------------------

Field Name        Field Description                 Type  Size  Dec  Key  Offset  Upper  CR  Default Entry Mask
--------------    ---------------------------------  ----  ----  ---  ---  ------  -----  --  ------------------------
ADDR1                                                A     30        N      31     N     N
ADDR2                                                A     30        N             N     N
CNAME             Contributor's name                 A     30        Y      61     Y     N
CONT.NUM                                             A      3        Y             N     N  ###
PHONE1                                               A     14        N     101     N     N  /(###/) ###/-####
RATE              Payment per thousand words         N     04   0    N       1     N     N  \$<####>.##
SUBURB                                               A     20        N     115     N     N
```

Listing 1. *Field definitions for the Sensible error file (Errfle), and the contributions file, (Contribs).*

```
C:CONTRIBS.SRR source file listing          Page No: 0001

0001              remark CONTRIBS - program was generated automatically by
0002              remark The SENSIBLE SOLUTION Program Generator  V2.0Ce  5/17/85
0003              remark
0004              remark This program uses the following file(s)
0005              remark Screen(s):          CONTRIBS
0006              remark Data File(s):       CONTRIBS      PAYMENTS
0007              remark                     MAILLIST      ARTICLES
0008              remark
0009              trap SAVE goto SAVE.GRP
0010              trap DELETE goto DELT.GRP
0011              mount screen CONTRIBS
0012 START        enter CNAME
0013              enter ADDR1
0014              enter ADDR2
0015              enter CURRENTPAY
0016              enter SUBURB
0017              enter POSTCODE
0018              enter PHONE1
0019              enter YTDPAY
0020              enter ARTICLE
0021              enter ISSUE
0022              enter ARTICLE2
0023              enter ISSUE2
0024              enter ARTICLE3
0025              enter ISSUE3
0026              enter ARTICLE4
0027              enter ISSUE4
0028 SAVE.GRP     save rec in file CONTRIBS confirm / clear buffer
0029              save rec in file PAYMENTS confirm / clear buffer
0030              save rec in file MAILLIST confirm / clear buffer
0031              save rec in file ARTICLES confirm / clear buffer
0032              goto START
0033 DELT.GRP     delete rec in file CONTRIBS confirm
0034              delete rec in file PAYMENTS confirm
0035              delete rec in file MAILLIST confirm
0036              delete rec in file ARTICLES confirm
0037              goto START
```

Listing 2. *Example of a data entry program produced by Sensible's program generator.*

128 byte blocks. This is done to ensure correct record-locking on multi-user systems, but it means you need to be aware of the potential for wasting disk space. The Sensible manual provides the example of a record structure of 500 bytes: it will be allocated four 128 byte blocks, with 12 bytes being 'ignored' per record. I'd rather use the example of a 385 byte record — in which you'll be wasting 127 bytes. If you have a file of a thousand records or more, that's a hefty overhead.

Getting back to the task of field definition, after entering the field name and file, you nominate the field type, size, decimal places, entry mask and whether the field is a key. Fields may be alphanumeric, numeric, date, overlay or record. Overlay fields combine all or a portion of two or more fields and record fields are pointers to records within a file. Entering a value in a record field will automatically retrieve the corresponding record. Character fields may be 255 characters long and records may be 26,596 bytes long. However, key fields must be no longer than 72 characters.

Key fields provide quick access to information. Sensible allows 10 fields to be nominated as keys per record. This sounds like a fair enough limit, but there's a slight catch — you can only search for records using key fields. There are no nice, slow sequential access commands like dBase's LOCATE, which will search a file for a value in any field.

The entry mask allows you to define how information will be input. You can right justify, left justify, include literals (such as parentheses around area codes in phone numbers), force entry and designate which characters can or cannot be included in the field. This mask can be overridden through program control for specific occasions, so a lot of flexibility is provided.

Once you've finished screen painting, Sensible's program generator will automatically initialise and key your data files and produce a data entry and retrieval program. Programs produced by the generator are not particularly powerful, and if you're writing to a number of files at one time, they're really not adequate. Of course, you can't expect much more from a program generator, and it does provide a useful basis for further program development, as well as providing a quick way to develop single-file data-entry systems.

Defining fields by screen painting is a fairly tedious procedure. Sensible lets you achieve the same result by directly entering the fields into the data dictionary. This is faster and provides a better overview of your file structures, with the option to print out a definition of your file and field structures. Listing 1 shows the definitions for Sensible's own error file and a simple contributor file I developed.

Sensible Solution's system specifications.

```
Maximum Program Size..................................... O/S Limited*
Maximum Data File Size................................... O/S Limited*
Maximum Number of Data Files.............................. Unlimited
Maximum Number of Records per Data File.................. 16,777,216
Maximum Number of Data Fields per Record..................... 1,000
Maximum Bytes per Data File Record.......................... 26,496
Maximum Number of Open Files in a Program.....................  16
Maximum Number of Indexes (Keys) per Data File Record.........  10
     (This includes One Pre-Defined Record Number Index)
Maximum Number of Keys per Screen or Program..................  160
Maximum Length of Key Field...................................  72
Maximum Length of a Single Field.............................  255
Stored Number Range:
     Maximum.................................. +99,999,999,999.9999
     Minimum.................................. - 9,999,999,999.9999
Decimal Place Precision.......................................  4
      (Computations are done to 5 decimal place precision,
      then rounded to the precision of the target field.)
Maximum Number of Accessed fields per Program.....  255**
Maximum Number of Command Lines per Program.....  2,000
Maximum Number of Command Line Labels per Program.....  300
Maximum Number of Nested Subroutines (GOSUB).....  20
Maximum Length of Reporter Print Line.....  Printer Limited
Maximum Number of Report Format Lines.....  60
Maximum Fields (fields) on a Screen/Report Format.....  255
Maximum Length of Field (Variable) Name.....  15

*
**   O/S Limited means limited by the disk capacity and operating system.
     An array is considered as a single field.
```

Defining fields and files in the data dictionary does not create the files on your disk. To do this you have to initialise the files; if you've changed fields in an existing file, you'll have to restructure your file and rekey it. You'll also have to recompile any programs which access that file. At program-development time this cyclical procedure can become a real pain, so it pays to get your file definitions right the first time.

Syntax-error Freedom

dBase, Knowledgeman, Condor and a few of the other systems we've reviewed have command-line interpreters, which allow you to type a command at the program's prompt and get immediate results. For example, in dBase you can type:

```
LIST company, crlimit FOR
(postcode='2000' .OR. postcode='2001')
.AND. crlimit>5000
```

and get an immediate listing of the Sydney city companies with a credit limit over $5000. With the Sensible Solution, everything must be done through a program, and because the program generator has very definite limits, you must expect to do the programming yourself.

The publicity guarantees programs you write in the Sensible Solution language will be free of errors. How can anyone guarantee this? By providing a language system which prompts you through the writing of each line and inserts all key words itself.

When you enter the source code editor and name the file you wish to create or edit, you are presented with an editing menu. From this you can change an existing line; insert and delete lines; mark, move and delete blocks; write blocks to temporary files; find specific lines or labels; and produce a printed copy of the program. These editing features are certainly an improvement over most internal word processors provided with database systems. But they need to be — with The Sensible Solution you *must* use the internal editor; you can't develop a long program in your favourite word processor and then compile it in Sensible. With short programs, this won't be too much of a hardship, but for heavy-duty work it could start to grate.

Listing 2 shows a data-entry program generated by the program generator for multi-file input. It's not the ideal program, but it shows the basic format of most data entry programs. Initial remarks are followed by 'traps' to provide routines for

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handling certain options available to the operator. The data entry screen is then mounted and 'enter' commands used to input data from the operator. 'SAVE.GRP' and 'DELT.GRP' are the subroutines referred to by the trap commands to handle saving and deleting of records.

When you press I (for Insert line) from the editing menu, you are prompted to enter a line label (optional) and then another menu appears with the possible commands you can use. Select the appropriate command by letter, and you are then prompted through the development of the command line.

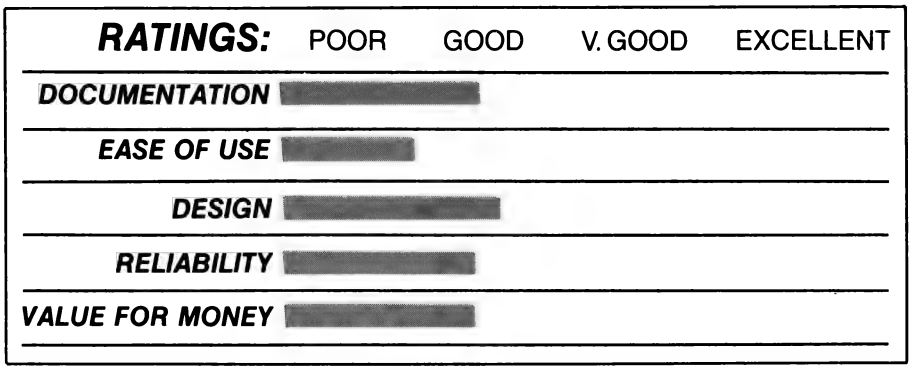
For example, to insert the line:
trap HELP gosub HELPME
after the other two trap lines, I type:
I <ret> T <ret> H <ret> G <ret> HELPME
Not only does this method ensure correct syntax, but it also saves on keystrokes. If you refer to a field in a command line, Sensible checks for its existence in the data dictionary and warns you if it doesn't exist. This prevents you from writing field names incorrectly; it also slows down program development when you know you want to do something and can't because the field hasn't been created. You have to exit the editor, create the field and get back to the editor. Pity there's no way to create fields from within the editor.

I found after a short time that I became fairly quick at developing lines with this method, but I wasn't convinced it was necessarily a good thing. The more I used Sensible, the more obvious it was that this is a programmer's tool, and not the plaything of the innocent. While it's pleasant not to have to bother about syntax errors, any experienced programmer will probably feel that syntax errors are low on the list of worries. If Sensible was destined for the desks of novice programmers, such a feature would save a lot of pain. (I would have appreciated it in my early days of batch COBOL programming, when I'd send off a stack of program cards to be processed and get no output back because I'd missed a single fullstop at the end of a line — over and over again.) But as it's a program for the knowledgeable, this feature is not a necessity, and the resultant restrictions it places on program development definitely outweigh the benefits.

What are the restrictions? Well, apart from being stuck with Sensible's own editor, the language provides only limited branching and no repetition structures.

PRODUCT DETAILS

Distributor:	Compsoft Australia, 537 Boundary Street, Spring Hill 4000; (07) 839 0066.	
Price:	**Single-User**	$950
	Multi-User	$1450
	Single User Runtime	$200
	Multi-User Runtime	$350
Best points:	Speed; language debugger	
Worst points:	Limited language constructs; complex development process	



You're stuck with IF and GOTO (or GOSUB). You're also limited in the extent of your IF statements. To get around this, you have to simulate other structures you need; for example, you can use IF and a memory variable to provide a loop. Memory variables are another sore point, which I'll get to soon.

I found this method of program development did nothing for enhancing my overall view of the programs I created; it was just a little bitsy for my liking. Now, if they could offer me a 'logic error free' language, I'd be first in line for a copy!

On the positive side, there were some powerful features and commands available. A lot of the boring maintenance work is actually incorporated in some of the commands, with 'trap' and 'find' doing a lot of work for you. You can also call other programs, both Sensible .RUN programs and other executable files (.EXE, .COM or .CMD files, depending on your operating system) from within Sensible programs. This certainly increases the flexibility of the system.

Getting it Out

There is a number of ways to get information out of Sensible. You can use the data-entry programs to search for specific records; you can use the screen-painting option to create report formats; and you can use the Inquire facility.

The most complex reports can be made using the screen-painting method. Screen painting is just the first step; you must then create a source code file and compile it, before producing the report. Reports can be 255 columns wide and contain 60 format lines. Totals and sub-totals can be handled using memory variables, multi-file reports are no problem, and all in all, your reports will be limited only by your programming ability. Output can be directed to the screen, printer or a disk file.

The Inquire facility is the closest thing to an interactive command in Sensible. It lets you retrieve data from a single file, choose which device for output, and create reports with four format lines. You can then save the 'inquire format' for later use. While it's good to have this facility, Inquire was considerably less useful than the equivalent commands in languages such as dBase because of the restrictions on selecting data. You can enter a number of selection criteria when using Inquire, with the system prompting for each criterion, one after the other. You could specify that 'LAST-NAME is SMITH and POSTCODE is greater than 2999 and POSTCODE is less than 4000 and CREDIT is not equal to 0'. But you can't specify 'AGE is less than 18 or AGE is greater than 60'. That is, each condition specified is automatically logically ANDed with the other conditions, so if your two conditions are 'AGE is less than 18' and 'AGE is greater than 60', you'll get absolutely nothing on your printout.

The Inquire facility is the closest thing to an interactive command in Sensible. It lets you retrieve data from a single file, choose which device for output, and create reports with four format lines.

Getting information out for use by other files requires a program in BASIC, Pascal or some other language which will read the Sensible files and process them. Once again, not a task for a novice, and certainly not as helpful as the standard export routines provided by many of the other databases available.

The Good, the Bad and the Ugly

I think my pet hate about The Sensible Solution is the lack of normal variables. Variables must be created as fields in the data dictionary; there is a file called MEMORY which Sensible uses for its memory variables, and which can be used for your own variables. The idea is to define a series of variables (1 byte string, 2 byte string, 1 byte numeric, and so on) which can be used in a variety of situations, and called from various programs.

It's probably my own fault for not being organised enough, but this system drove me batty. dBase II's restriction of 64 memory variables started to look like heaven. The problem was most acute when in the middle of editing a source code file I realised I needed some temporary storage for a value and *knew* there was no such field available in the memory file; I had to go out of the source code editor, into the data dictionary, define the field, go back into the source code editor and continue.

Arrays are treated in a similar, though somewhat more complex manner. By giving a series of similarly-defined fields consecutive alphabetical names, they can be treated as an array using the '&' notation. The names need to be in alphabetical order because Sensible stores fields in alphabetical order, and an array is treated as a series of contiguous fields — not the simplest technique, but useful.

The documentation is a mixed bag. I found the tutorial accurate and easy to follow, but it didn't really tell me where we were headed. No overall view of the system is provided, and with the variety of methods available for achieving similar tasks it's easy to become confused as to which technique to use in which circumstances. There is no index, which seems to me to be plain lazy.

The reference section consists of a blow-by-blow description of the operation of each of the main-menu selections, and a description of each command. There is an index of sorts here, which is lucky, because the command descriptions are not in alphabetical order. One thing I liked about the documentation was its extensive use of screen displays and diagrams.

Other features of Sensible which are worth noting are the extensive debugger provided in the language and the speed of operation. The debugger made it even more obvious that this is a programmer's product, and I especially liked how it could be invoked at any time during program execution and testing. The speed of operation of the system itself, the compiler, the program generator and programs produced by the system were all excellent.

How Does it Compare?

The Sensible Solution is definitely not a program for the uninitiated. Its lack of a command-line interpreter and any real power in the automatic program generator must restrict its use to those prepared to get their hands dirty programming.

As a system developer's tool it provides a lot of power, but certainly doesn't outstrip products like Dataflex and Knowledgeman. If system developers are the target for this product, then O'Hanlon's would have done better to leave the syntax checking to the users and provide a few more extensions to the language itself. After testing it, I was quite happy to go back to dBase. □

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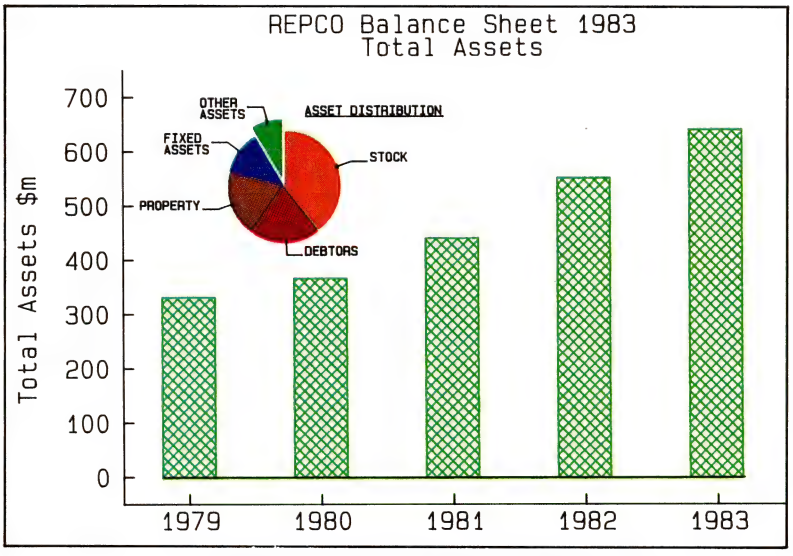

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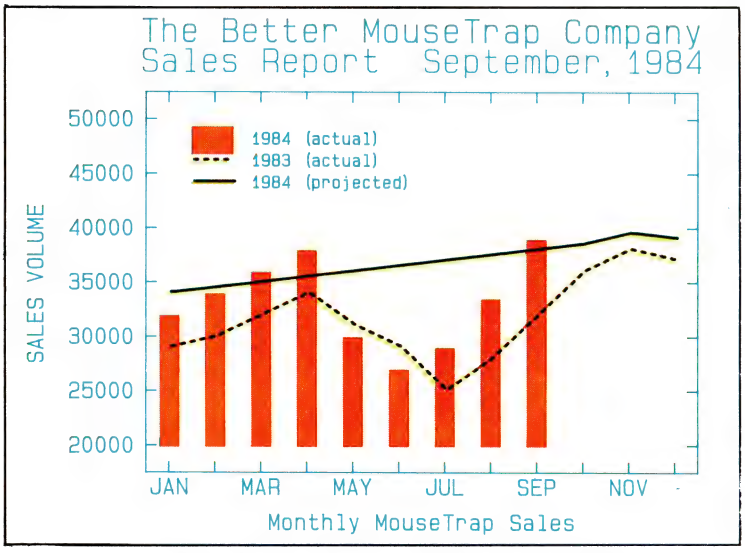
(Charts shown here were produced with Houston and Hewlett-Packard plotters, on a Televideo 803.)



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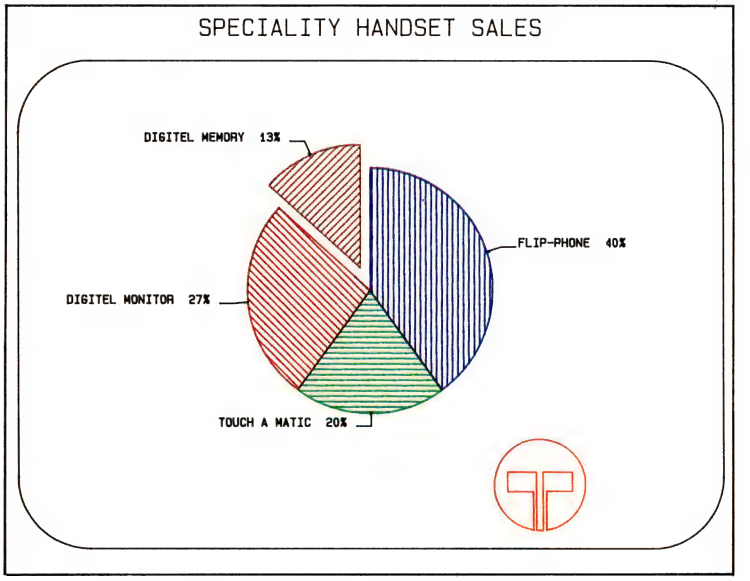

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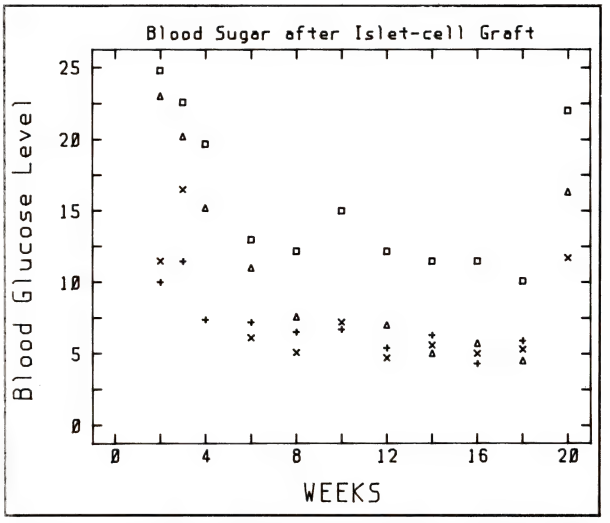

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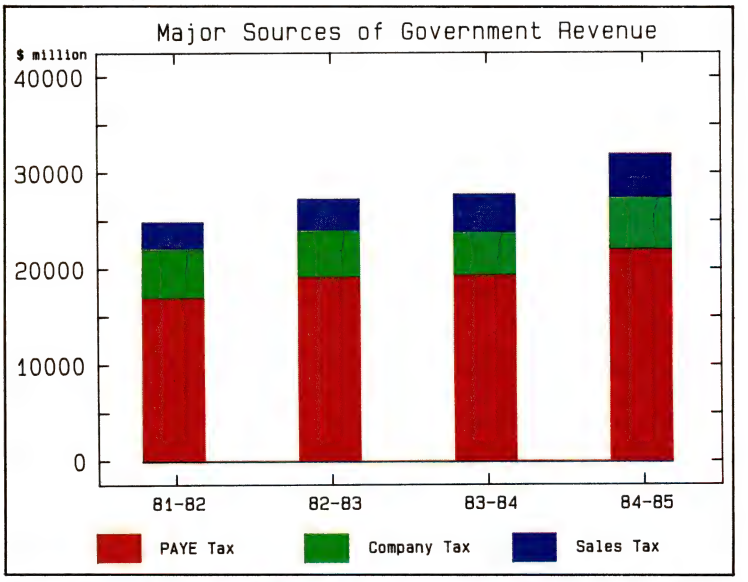

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REMEMBER MARVIN, the classy robot from *Hitchhiker's Guide to the Galaxy*? He had a delightful throw-away line designed to upstage his humans: "I'm so *bored*!" ...

Is it the way some accountants think, or is it the nature of accountancy itself? Why do accounting packages have to be so boring? I'm sure not all of them are.

The FBS system is advertised as a kind of management liberator. The advertising suggests that "as a manager you often find yourself so wound up in 'administrative' duties that you don't get time to do the things that attracted you to the business in the first place — the grass roots of your business." That's a fair comment. Let's say the program you wrote is now starting to sell, your collection of clients is growing, and you are adding other product lines to your offerings. The money is flowing, and you find yourself 'bean counting' instead of writing software or whatever. You've cobbled up some sort of manual system because the cash flow was initially too small to justify a computer-based system, but the time has come. And here's a system which promises it has been designed "so that it can be operated by someone who ... has only minimal knowledge of bookkeeping procedures."

If you have training in accounting principles, you should be able to hop straight into a package like the FBS system without much hassle. But if you think a general ledger is some kind of horse race, you may find this one a bit bewildering. A "minimal knowledge" of accounting won't be good enough, and it seems most folk who wind up needing an accounting package have skills and a language quite different from those of the bean counters. Some of you may be aware I have a background in accountancy, so I speak the lingo.

Quite frankly, the FBS system documentation is rough on non-accounting types. It assumes a knowledge of accounting principles and reflects a very pedestrian approach to software design. It is reminiscent of the kind of software which floated around in the late '60s; the menus are unimaginative and not particularly helpful, there is no 'help' key facility, and the error messages are often cryptic.

Software developers should recognise that most users, rightly or wrongly, want to go straight to the disks for a "quick try". It shouldn't be necessary for them to wade through pages of introductory documentation before reaping some immediate gratification from the screen. Even a simple 'Read Me First' document, or better still, a programmed demonstration run, would be an enormous confidence booster.

Instead, the FBS manual kicks off with a warning: "Please read this section before you try to use the FBS software. It will take you half an hour, and will probably save you many hours of frustration which may occur if you skip it!" A list of contents is then presented, followed by "We hope you are now convinced that you should read this section *carefully*!." Whatever happened to user-friendly?

The onus for user education in this case rests squarely with the dealer. He gets a fairly handsome mark-up for the product, and is expected to perform accordingly. That approach was fine 15 years ago, but not in today's competitive market. I have the feeling that if FBS invested seriously in developing a matching computer-based training program for its product, it could do very well from direct and retail sales. Even an annotated walk through a complete accounting cycle would be a great step forward — you could have the option of skipping most of the hard-copy reports, or of piping them to the screen just for the demonstration.

The FBS documentation is presented in a no-nonsense three-ring binder, which also holds the four floppy disks containing the system. There are five principle sections:

- Start-up procedures
- Debtors and invoicing
- Stock control

```
                    FUTURE BUSINESS SYSTEMS
                      01/10/85      VERSION:FBS 16.7
              LICENSED TO: FUTURE BUSINESS SYSTEMS : DEMO ONLY

                              MAIN  MENU

1)    DEBTOR & INVOICING SYSTEM          5)    STOCK FORWARD/BACK ORDER SYSTEM

2)    STOCK CONTROL SYSTEM               6)    PAYROLL SYSTEM

3)    CREDITOR SYSTEM                    7)    PRODUCTION MANAGEMENT SYSTEM

4)    GENERAL LEDGER SYSTEM              U)    SYSTEM UTILITIES

                          S)    SHUT DOWN SYSTEM

                    ENTER FUNCTION NO. (<CR>=MAIN MENU)
```

Figure 1. FBS *System opening menu.*

```
                    FUTURE BUSINESS SYSTEMS
                      01/10/85      VERSION:FBS 16.7
              LICENSED TO: FUTURE BUSINESS SYSTEMS : DEMO ONLY

                          DEBTOR & INVOICING MENU

11)   DEBTOR MAINTENANCE                 15)   DEBTOR JOURNAL ENTRY

12)   DEBTOR REPORTS                     16)   DEBTOR TRANSACTION LEDGER

13)   INVOICE/CREDIT NOTE ENTRY          17)   DEBTOR STATEMENT PRINTOUT

14)   RECEIPTS/DISCOUNT ENTRY            18)   PRINT BATCHED INVOICES

                          19)   PRINT INVOICE REPORTS

                    ENTER FUNCTION NO. (<CR>=MAIN MENU)
```

Figure 2. *The debtor and invoicing menu.*

- Creditors
- General ledger

All are quite detailed, sometimes too much so; for example, there seems little point in telling you what the error message will be if you key in a wrong account identifier — you'll get the message when it happens. The effect is a 'noisy' production and a lowered 'signal-to-noise' ratio. A pity, because there is good meat in this menu-driven diet.

To configure the system with your own company name you must contact FBS to obtain a corresponding password. In the meantime you can use the system as supplied, with FBS's own name and dummy data. This seems an admirable method of protecting software without resorting to copy protection. Individual modules may be added at a later date, and these too are protected in the same way.

Password protection is available for selected functions if required.

The FBS system allows immediate updating of all affected files (such as stock levels, debtor balances and sales) after each transaction is entered, so the current state of the business is accurately reflected in the system. The relevant files can be accessed at any time by authorised persons, allowing up-to-the-minute accuracy

```
          FUTURE BUSINESS SYSTEMS
      01/10/85        VERSION:FBS 16.7
LICENSED TO: FUTURE BUSINESS SYSTEMS : DEMO ONLY

                STOCK CONTROL MENU

       21)          STOCK MAINTENANCE

       22)          STOCK REPORTS

       23)          STOCK RECEIPT ENTRY

       24)          STOCK RECEIPT REPORT

       25)          STOCK PRICE UPDATE

       26)          STOCK TAKE ENTRY

       27)          STOCK LABEL PRINT

    ENTER FUNCTION 0. (<CR>=MAIN MENU)
```

Figure 3. *Stock control menu.*

```
          FUTURE BUSINESS SYSTEMS
      01/10/85        VERSION:FBS 16.7
LICENSED TO: FUTURE BUSINESS SYSTEMS : DEMO ONLY

                CREDITOR MENU

       31)          CREDITOR FILE MAINTENANCE

       32)          CREDITOR REPORTS

       33)          CREDITOR TRANSACTION ENTRY

       34)          CREDITOR JOURNAL ENTRY

       35)          CREDITOR TRANSACTION LEDGER

       36)          CREDITOR REMITTANCE ADVICE
```

Figure 4. *The creditor system menu.*

of record keeping. The general ledger, if used independently, operates as a cash-book system for cash receipts and payments.

Figure 1 shows the package's opening menu. In the system supplied for review items 6 and 7 evoke a "SYSTEM UNAVAILABLE (PRESS A KEY)" message.

Debtor and Invoicing Subsystem

Debtor information is stored according to a six-character alphanumeric name key and is maintained in key sequence to avoid sorting. The stored data includes the debtor's name, address, phone number, contact, sales tax exemption number, agent number, classification code, charge account, discount levels and price categories, credit limit, and aged payments. Twelve-monthly periods of sales history are maintained for each debtor, providing data for sales reporting.

Enquiries about individual debtors are possible, with output to either the screen or a printer. Printed reports can be organised by name key, classification, agent number, invoice number, zero or non-zero balance, and/or charge account. Reports include quick reference, debtor, aged trial balance, mailing labels, debtor sales history, debtor gross margin by invoice, debtor sales tax by invoice, and debtor information sheet.

The invoicing system is flexible and allows editing of individual items right up to the time of printing. Invoices can be batched or printed on a one-off basis, at which time the corresponding debtor and stock files are updated.

Back-ordering can be interfaced with the invoicing system, and full audit trails are also printed. Interfacing to other modules is 'automatic' if those modules exist.

Entry of cash payments produces a complete banking pay-in slip.

Figure 2 shows the debtor and invoicing menu. The double-digit selection options may seem a little strange, but it is possible to reach any of these options from the main menu (see Figure 1) by entering the two-digit item directly. On the other hand, it seems a bit redundant to do so when already in the secondary menu.

Stock Control Subsystem

Stock items are identified by a name key, which can have up to 10 characters. This allows room for predefined fields within the key, such as bin location or store number.

Data stored for each item includes its description, unit sales code (for example, EACH), number of singles per pack, packs per carton, sales tax, average cost price, new cost price, six coded prices, number in stock, re-order level, number on re-order, number on back-order, and quantity sold mtd and ytd. It's not clear how one handles goodies which don't come in packs or cartons.

Utilities exist for global price modifications. Reports can be generated for price lists, product and services sales reports, stock lists, stocktaking sheets, re-order reports and so on.

Sales tax categories are stored within the stock file, so amendments to sales tax legislation can be effected by a simple change to a master sales tax table.

The Creditor Subsystem

Creditor name keys, like debtor name keys, may have up to six characters for identification. For each creditor the system maintains a name, address, phone number, contact name, default general ledger account number, classification code, default days for payment, discounts, last payment date, last payment amount and aged payments, and purchases mtd and ytd. Twelve-monthly periods of purchasing history are also maintained.

Entry of creditor invoices allows for the immediate updating of corresponding stock item records, while entry of creditor transactions and journals allows aging and allocation to specific general ledger accounts.

The General Ledger Subsystem

This module may be used as a standalone system for cash sales operations, or it may be interfaced with the other modules in the system.

The general ledger system includes a standard chart of accounts, which may be modified by the user as required. The user also has the option of designing his or her own report layouts, although the system is provided with six standard formats:

- Chart of accounts
- Audit report
- Trial balance
- Profit and loss
- Balance sheet
- Budget comparison

The reporting period, although usually month, can be easily altered.

Each general ledger transaction includes an account number, name key,

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FBS ACCOUNTING

```
                    FUTURE BUSINESS SYSTEMS
                 01/10/85        VERSION:FBS 16.7
          LICENSED TO: FUTURE BUSINESS SYSTEMS : DEMO ONLY

                      GENERAL LEDGER MENU

41)   ACCOUNT & NAME-KEY MAINTENANCE     44)   MULTIPLE TRANSACTION ENTRY

42)   COMPULSORY ACC. CODES              45)   TRANSACTION LEDGER

43)   TRANSACTION ENTRY                  46)   REPORT FORMAT GENERATOR

                          47)   PRINT REPORTS
              ENTER FUNCTION NO. (<CR>=MAIN MENU)
```

Figure 5. *The general ledger menu.*

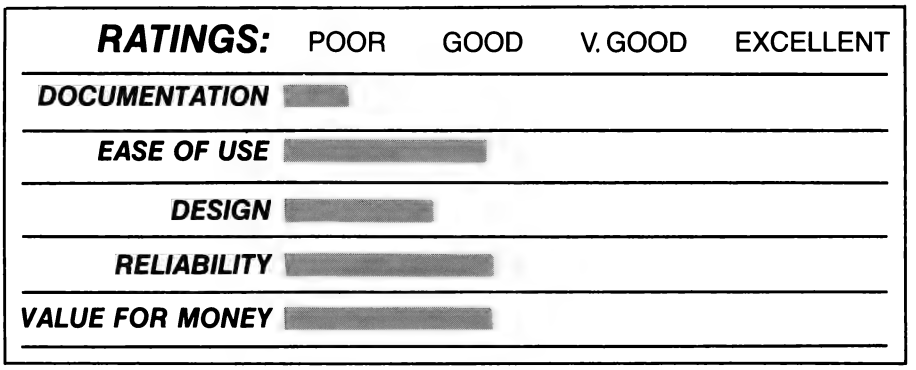
transaction description, transaction reference number and amount. Interactive account enquiries are supported. The manual maintains that "extremely efficient programming techniques are used to give immediate response to G/L balance enquiries". Without recourse to entering a mighty big test database, there seems little else but to take this assertion at face value. Certainly many accounting systems fall down at this point.

The package also has facilities for supporting multi-company accounting and consolidation reporting.

Miscellaneous Gripes

Version 16 of the FBS system is designed specifically for MS-DOS machines. Since MS-DOS supports time and date functions, it seems odd that the FBS system continues to rely on a file (DATE.TEX) to hold the current date. When the system is first fired up you are invited to change the stored date or to accept the current value. There is no hint as to whether it is in the American or British format, and it complains if you do not include leading zeros for the day or month.

Most replies to FBS prompts are



PRODUCT DETAILS

Manufacturer: Future Business Systems, 6/105 Hawthorn Road, Caulfield North 3161

Recommended prices: **Basic system** (Debtors, Invoicing, Inventory, Creditors, G/L, Report Generator, Export feature) — $2278
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- Payroll $795

Applications
- Rag Trade Fwd Order $895
- Service Station System $1550
- POS System $1550
- Contractors FBO/EST $895

accepted by the BASIC INPUT statement. It is better programming practice to use the INKEY$ function to actively scan the input before the <CR> key is struck.

The package also has a number of typographical errors (for example, 'you' for 'your') — both on the screens and in the documentation — how about "fully intergrated"?

The 'quantity' fields in the stock control system are in currency format (that is, as dollars and cents).

When displaying invoices and statements, or when printing them, there is no recognition of the PC's ability to display (or print) the box-drawing characters. Instead, the system displays 'I's for verticals and hyphens for horizontals. At the printer level, this means you must stick with preprinted continuous (Rediform) stationery, although many PC-compatible printers allow the direct printing of extended graphics.

There is similar inflexibility in the selection of label stationery: it must be single-width, and 2.5 cm high.

Choice of keys for debtors, creditors, stock items and account names is broad — you can use alphabetic characters as well as numerics. But the system distinguishes lower-case alphas from those in upper case. In other words, the debtor name HARDIE is different from Hardie — that's dicey. So too is the ability to include blanks as valid key characters.

There is a 'wildcard' search for scanning keys. It uses the '*' and '?' symbols familiar to CP/M and DOS users alike, but the syntax is totally different — and not as logical. If the results of the search exceed the screen capacity, it pauses for a keystroke, but instead of clearing the screen and resuming the display from the top, it then scrolls (slowly) from the bottom.

After exiting to the operating system, the default screen colour is set to cyan on black, when it should return to the original (white-on-black) setting.

All rather trivial complaints, but they combine to give an impression of amateurish programming and an outmoded attachment to its eight-bit origins. There is considerable scope for some remedial cosmetology.

Pricing

Although the price is not cheap ($2278 for the system reviewed), it is well below correspondingly configured systems such as Attache, IAL and Sybiz. The FBS price includes 12 month's hotline assistance ❑

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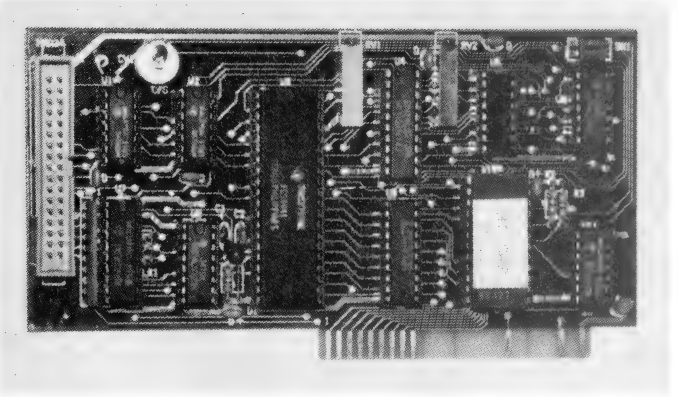

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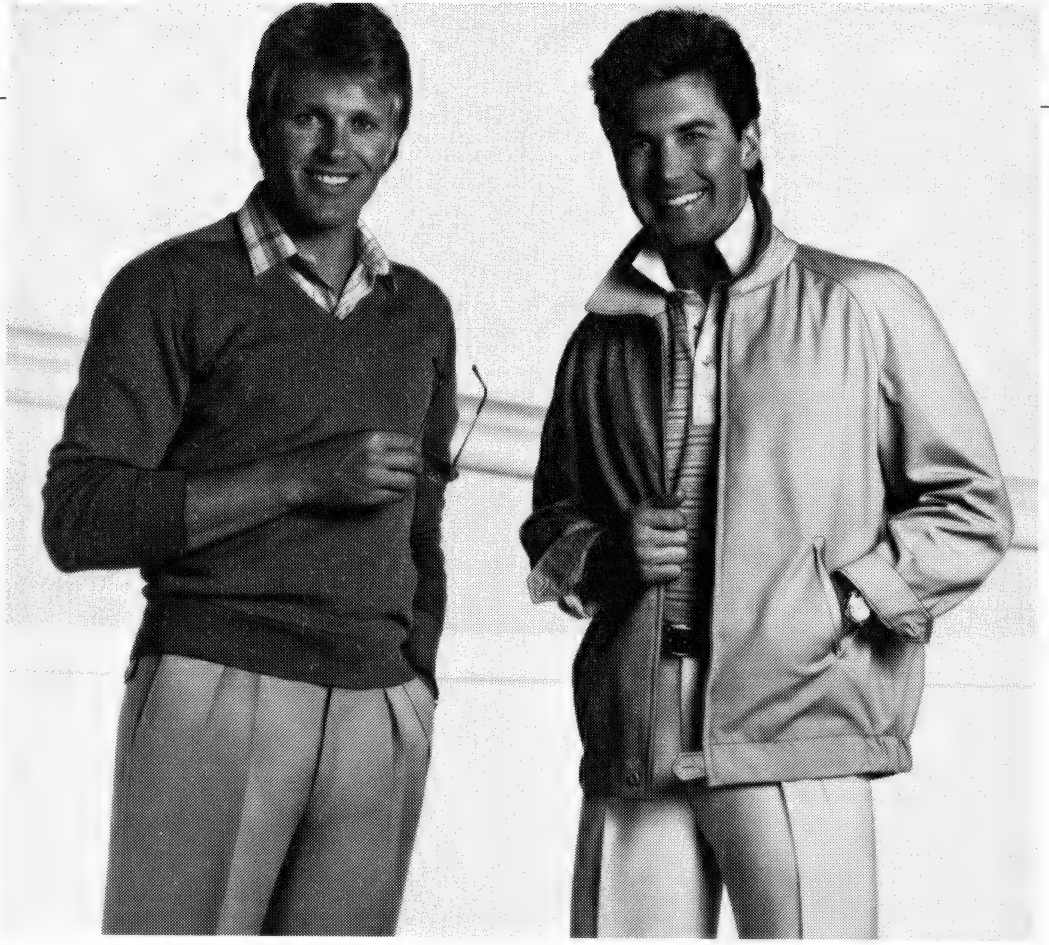

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BY NORMAN KEMP

VIATEL GRAPEVINE

Australian Viatel Systems Come Of Age

This column is coming to you courtesy of Viatel. So what's different? For the first time since I started writing this page I've been able to perform my own do-it-yourself search with a videotex program actually running on my own computer. Thanks to the generosity of vendors and enthusiasts who patiently allowed me to fossick around Viatel on their equipment from its founding to the present day, I've been able to keep the obligatory 1200 words coming. But now it's at my expense I've learnt that one of the key commands is *92#, which sends up a frame showing how much I owe Telecom for the month, current session excluded.

By the time this article is printed there will probably be a move among many dealers to provide Viatel modems with a Prestel-type software communications package for as little as $400. The alternative is to shop around for specially written packages. Although there aren't many on the market yet, the number is increasing: apart from two recently delivered for me to try on an IBM-compatible, I also have test copies for the Microbee and NEC APC III, but not the hardware.

First to arrive was the Neologue VTEX program, designed by Peter Hermann of Wahroonga, Sydney. After trying to get it started and finding a lot of garbled symbols on the screen, I phoned Peter, who came to set it up specifically for the machine. He soon got it working and promised future packages would have the start function for a number of popular computers built-in. The user will be able to select the mode for their particular computer from a menu.

Neologue VTEX software disks are not copy-protected, but as Peter intends to sell through dealers handling a variety of modems, he's working on an ingenious ploy to avoid free-for-all piracy. Without revealing the secret, the essence is that software will be bundled with and configured to each brand of modem, so it will be able to run on the device with which it's sold, but not on other equipment. If the user takes it to another modem it won't work, nor will a copy.

VTEX comes in separate versions for users who only want to access Viatel, or for information providers who need complex editing facilities. The current price for the user disk without modem is around $280, but this is expected to be reduced within a couple of months as demand grows, and will be cheaper when it's bundled.

By the time this article is printed there will probably be a move among many dealers to provide Viatel modems with a Prestel-type software communications package for as little as $400.

Neologue VTEX can be used manually or with an autodial modem, and is designed for 300/300 baud BBSs, as well as the 1200/75 standard for Prestel-type communications. My modem was a British-made Tandata TM 200, which took modified Neologue software, loaned by GEC Digital of North Ryde (which will shortly be making them in Australia).

Only Technical Boffins Need Apply

The Tandata manual, if it can be called that, was made up of photocopied technical specifications, and was virtually unreadable by anyone other than a technical boffin.

On booting, VTEX invoked the dial-up menu located in the modem, and pressing '1' immediately called Viatel. The user can enter eight numbers into the program, either for manual or auto-dial access. After a pause, COM appeared on the screen, and a few seconds later Viatel responded with its logo and demands for personal identification and password. (Although these can be entered into a modem to save remembering a cumbersome series of numbers, you shouldn't do this if other people also want to use the equipment, because they won't be able to dial out using the same code.) From there it's a matter of following the instructions in the latest Viatel index, keeping the Neologue VTEX manual handy for reference.

The present manual contains enough information to enable a proficient PC user to call Viatel and work through it without much difficulty, but the presentation is rather technical. It enables the user to begin by configuring VTEX to a particular PC for an RS232 port, using the autodial modem, defining the display monitor for colour or black and white, defining the graphics card (VTEX will support a Hercules black and white card but not colour), and setting a series of function and command keys.

For reasons of economy, Viatel users should save as many of the frames they are viewing as possible so they can browse over them at a later date; it's easy to forget it costs eight cents for five minutes when absorbed with the menus and information provided on the screen. VTEX has capabilities for saving single and multiple frames, as well as searching for new ones and retrieving previous pages. A HELP facility is provided, but it over-writes the screen, so it may obscure some point when information is being sought simultaneously. Viatel produces graphics and text in a variety of colours, and a set of optional filters is provided in the VTEX software.

After saving, Viatel text can be printed in the usual way, but inexperienced users should remember graphics can only be presented on a dot matrix printer and shouldn't be attempted on a daisywheel.

Fix It With Software

The VTEX manual includes a comprehensive list of error messages. Fortunately, I didn't need most of them — in the early stages the most common was 'unknown communications port name', which meant the serial port hadn't been entered correctly; this was subsequently fixed with a batch file. The problem of the screen filling with strange characters was solved when Peter Hermann correctly installed the ANSI driver. It needed a 'fix' from his software, but this should be taken care of in later versions. For copyright reasons VTEX doesn't come with the operating system on the disk; Peter has suggested the work- ▶

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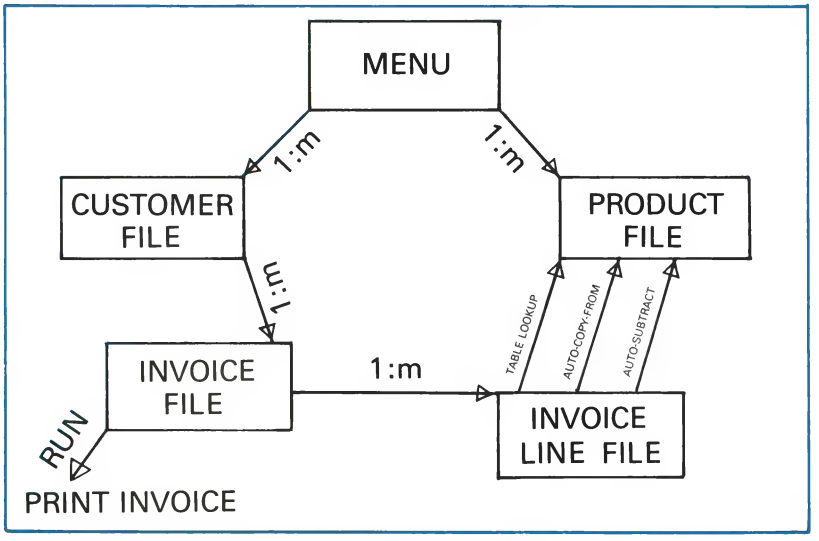

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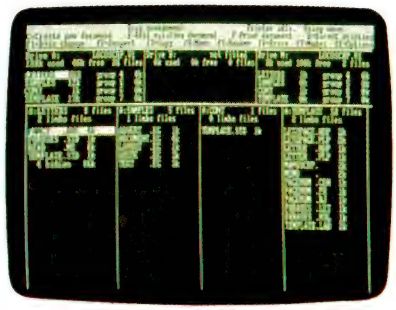

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ing copy be on a full system disk which can have the unneccessary files deleted later. This will leave CONFIG.SYS, COMMAND.COM and ANSI.SYS on the VTEX disk exactly as they've been written for the computer. There will be ample space for saving pages from several working sessions on Viatel, so a disk in drive B may not be required.

VTEX has a number of features which can be learnt by practice over a period of time. There is, for example, a high/low-resolution capability. For personal computers with the graphics card, data on the screen can be displayed either in full colour with slightly reduced resolution and all characters drawn in single height, or full resolution in one colour. Some frames of the educational question-and-answer type may contain information which can be made to appear or disappear at the touch of a key.

The present series of VTEX is constantly being revised. A new feature which should be available soon is a version for the IBM PC/AT enhanced graphics adaptor, which can also be used in the IBM PC where there's no colour card. Other developments will provide improved facilities for electronic mail and office telexes.

A brand-new arrival is Gateway, from Cybersoft, a company recently formed by two programmers who work with the accounting software firm O'Reilly Computers in Sydney. This product, which comes with a neat illustrated manual, should be available commercially before December, and is expected to be priced at $200.

Gateway is able to display videotex pages on a PC in two different formats: a standard 40-column by 25-line display in the centre of the screen, with operator information and prompts on either side, and black and blue tones on a colour screen; or a standard 80-column by 25-line display with full colour. The user can flip between the screens at any time, and a lot of the HELP information remains visible while viewing the screen.

Gateway also provides a powerful 'search and grab' feature which enables the software to retrieve already-known pages in a minimum period of time. A video page containing graphics saved on disk can be 'translated' into standard ASCII format, which is compatible with most word processor and spreadsheet systems. Thus, videotex information such as share prices, exchange rates and other financial information can easily be incorporated into reports or business plans. Other programs can be used within Gateway; the designers claim a letter prepared on a word processor can be sent online to an electronic mailbox without the user having to leave the Gateway system.

Neologue VTEX software disks are not copy-protected, but as Peter intends to sell through dealers handling a variety of modems, he's working on an ingenious ploy to avoid free-for-all piracy.

Both Gateway and VTEX are clearly designed to meet the immediate needs of Viatel users, particularly those with business applications. They're highly competent and well-thought-out systems which won't worry novices, yet they are capable of further enhancement. They also have the added edge of being written specifically for local conditions.

Writing for Viatel Prestel is a challenging occupation, and no doubt there'll be many more programs in the not-too-distant future. If these can make Viatel easy to access, and help the user move around and find and save pages of information, they'll make the service more attractive to both private and business communities in Australia. For more information, contact Neologue, 16 Gilda Avenue, Wahroonga 2076, phone (02) 487 2859; or Doug Scadlock at Cybersoft on (02) 599 3865. □

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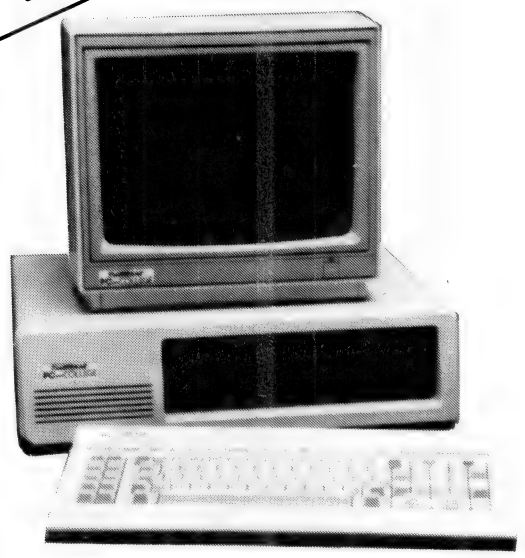

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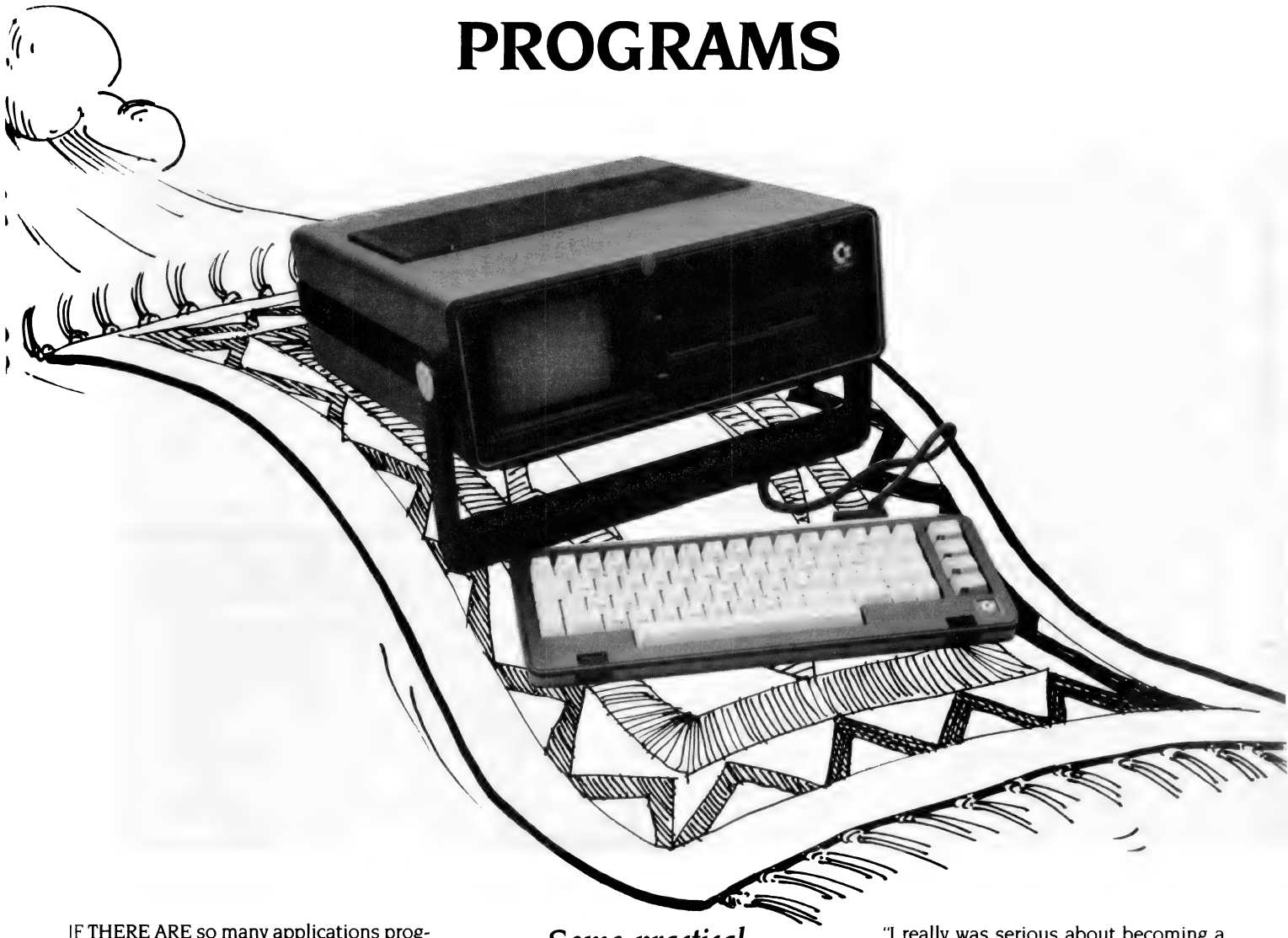

Some practical programming on a Commodore SX-64 and the Brothers Bruce are rugged up for business.

IF THERE ARE so many applications programs suitable for small businesses on the market, why bother to learn to write one? This was the question Peter Bruce posed when he and his brother Damien looked around for a program for their new carpet retail shop. The task seemed easy: study one package after another and the right one would eventually turn up. But as the Brothers Bruce discovered, life with a computer was not meant to be easy; so 26-year-old Peter decided to turn what small knowledge of programming he'd gained while doing a course on building construction into a real business activity.

For a couple of years before he went into selling carpets, Peter Bruce earnt a living as a carpet layer while studying building. During his course at Tech, he bought a Commodore 64, a $180 database management package, Superbase, a disk drive and a printer.

"I really was serious about becoming a licensed builder, and I started to teach myself BASIC so I could write some programs on cost estimating on Superbase," he said. "While I was studying I was also subcontracting on carpet laying, and the opportunity came up to buy the business from the owner, who wanted to retire. It meant a change of direction and a new challenge, but I didn't hesitate."

Business Boom

Just over a year ago Peter and Damien took over the shop in the Sydney beach suburb of Coogee and called it *The Carpet Factory*. The business had previously been run manually, but Peter changed all that with a ▷

second computer, the Commodore SX-64. A second shop is expected to be operating by the end of this year, and a third in 1986.

"Our aim is to have a network of carpet shops in the busiest of Sydney's suburbs," he said. "We often talk about having 100, but the more realistic number will be half a dozen in the near future."

Having two computers enables Peter Bruce to program one solely for stock inventory, ordering and remittances, and the other for keeping records of day-to-day costs and estimating jobs and printing out quotes and invoices. "I found trying to do all jobs on one computer confusing," he said. "It seemed a logical idea to put one in the back office and one on the counter, and to use whichever was appropriate at the time, each with its own printer. Most of the programs are fairly short, but they cover every aspect of the business."

One of the first programs he wrote was the co-ordination of the colour numbers of various carpets with the phone numbers and addresses of about 60 suppliers, and a facility to write an order. A remittance program seeks out payments due on particular dates and queries whether they're to be paid or entered to a future date. A remittance advice is printed for each order requested.

Having two computers enables Peter Bruce to program one solely for stock inventory, ordering and remittances, and the other for keeping records of day-to-day costs and estimating jobs and printing out quotes and invoices.

To date Peter Bruce has written about 10 programs for various aspects of the business, using the database package to design the layouts for each form, but adding instructions in BASIC for particular requirements. One program enables him to change the database disks on the drives.

"The disks only hold about 180 Kbytes of information, so I had to devise a way of holding the drives by means of a loop while I changed disks. It wasn't a difficult program to write and it has saved a lot of effort which would've been duplicated."

Another self-written program has been a conversion table from feet and yards to metric measurements. "People still come in with the old measurements, but the computer can convert them in seconds," he said. "The carpet business is one in which people still haven't adjusted to the new measures, and it takes a long time to work out the calculations manually or even with a calculator." A more complicated program holds records of customers and includes initial enquiries and information about jobs, as well as job specification sheets for orders, quotes and invoices. The

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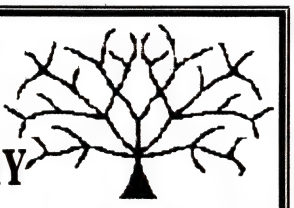

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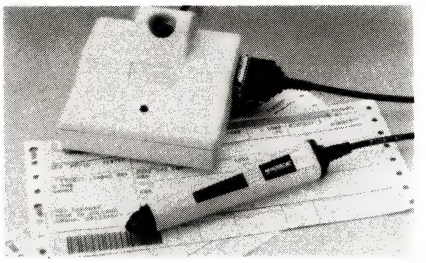

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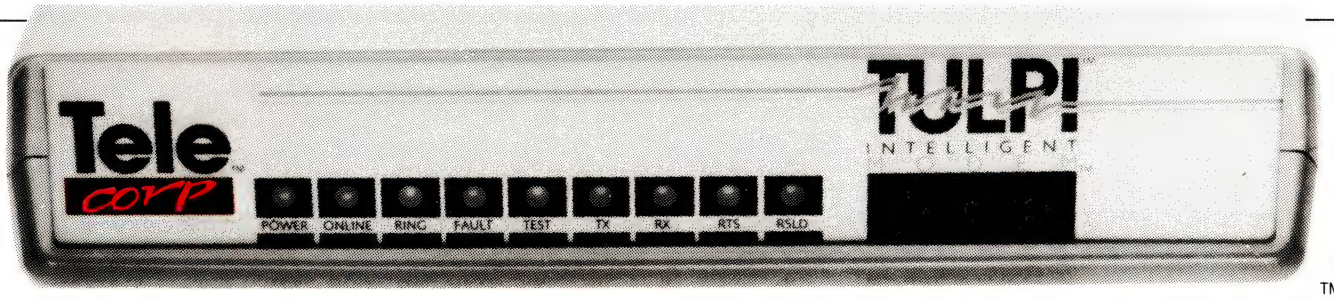
This service has been particularly useful in providing quick quotes for real estate agents who are letting houses and flats for owners and are responsible for repairs and renovations. "Using the computer enables us to prepare and deliver a variety of quotes which would take much longer to estimate any other way," said Peter. "There are several agents who can ring us and wait on the phone while we give a quote, which is much faster than a lot of other firms, and it is giving us a very good competitive edge in the business."

Paradoxically, customers who call at the shop are often not so impressed with the speed. "They may be expecting to be spending a lot of money on their purchase, and it gives the wrong impression if we turn up with a quote within a minute or two," said Peter. "They think there is something funny or wrong about a quote that doesn't take several minutes to work out and they think we're making it up on the spur of the moment. So I spend more time than is necessary looking at the computer and being serious until I judge the moment is right to print out the answer. Of course it was there all the time, but it wouldn't have the same effect if I just turned to the machine, pressed a few keys and produced the answer with no apparent effort."

To date Peter Bruce has written about 10 programs for various aspects of the business, using the database package to design the layouts for each form, but adding instructions in BASIC for particular requirements.

Peter realises future expansion will require a computer with larger capacity than the two models currently being operated, but he's planning on retaining the SX-64 models for internal shop purposes and combining the information on a Commodore 128. "The small computers will continue to do the essential jobs and almost all the programs needed have been written for them," he said. "The large one, when it arrives, will be programmed to update those records and provide more management information. With the experience we have gained, we won't require ready-made applications, but will continue to write for our own needs to cope with future changes and expansion." □



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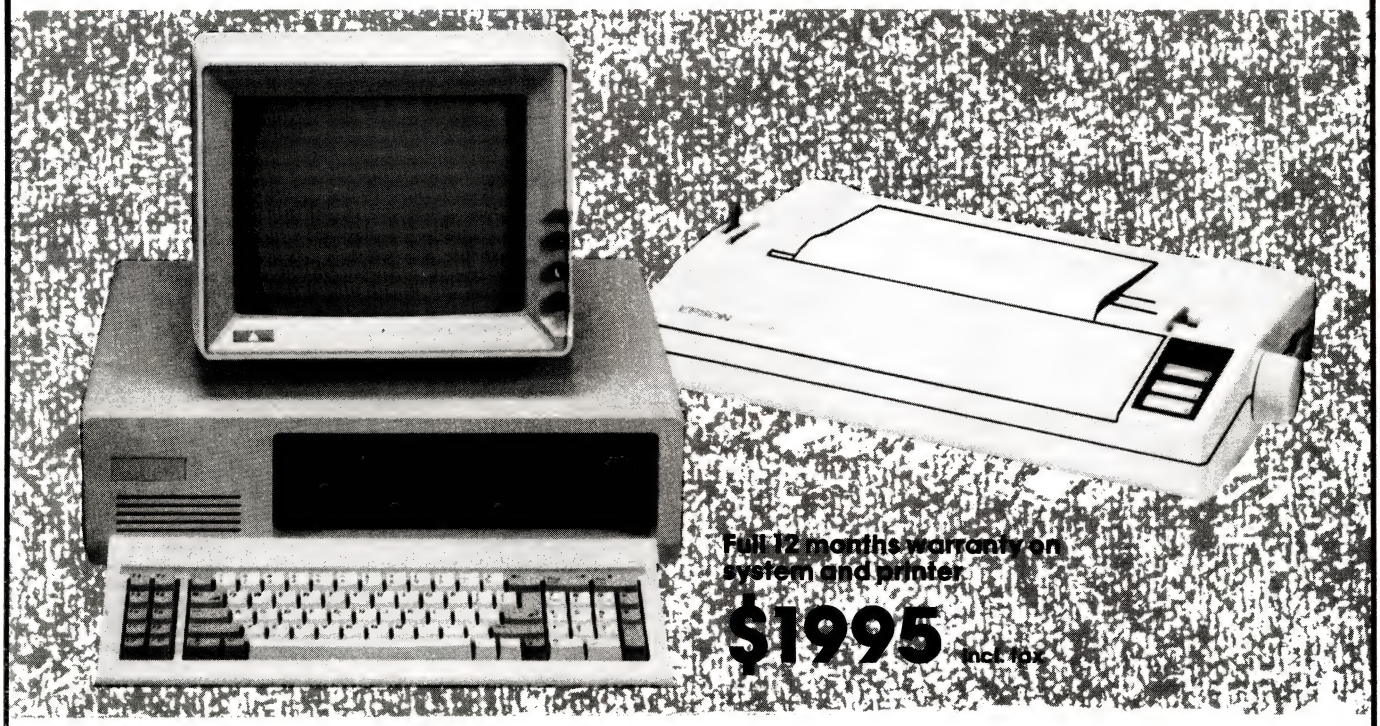

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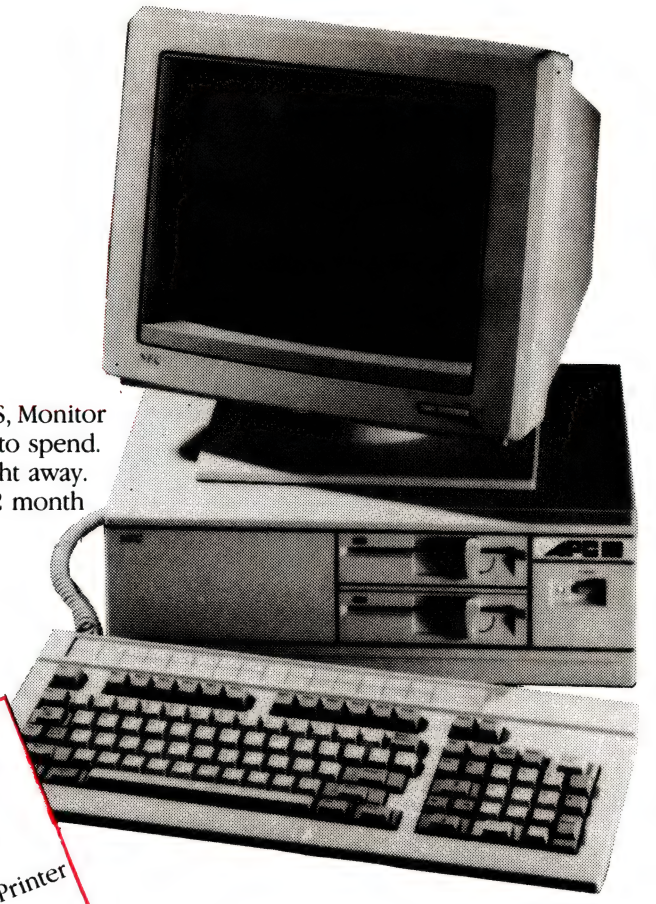

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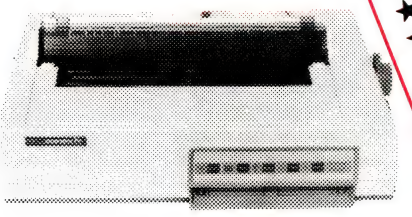

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After many years of having praise and abuse heaped on Wordstar, Micropro wrote an entirely new program, Wordstar 2000. How good is it as a word processor and how does it compare with the original? John Nicholls, who has used it extensively, gives his opinion.

WORDSTAR 2000 is a completely new program; there isn't a line of Wordstar code in it. At present it is available in only one version, for the IBM PC, Compaq, and Compaq Plus. Unlike the original, it is written in the C language, which is slower than assembly language but easier to change to run on other computers.

My first reaction to Wordstar 2000 was that it's *big*; the program disk as supplied takes up 333 Kbytes, so there is little room left on a 360 Kbyte disk and no room at all for DOS. The dictionary is even larger, occupying 338 Kbytes. To run the program, you need 256 Kbytes of RAM for DOS 2.0 and 2.1 or 320 Kbytes for DOS 3.0. (The program won't work with DOS 1.0 because it won't fit on a 320 Kbyte disk.) You need a minimum of two floppy drives, but a hard disk is recommended. This report was written on a 544 Kbyte system with two floppy drives, and although Wordstar 2000 will work with this configuration, there are some major advantages in using a hard disk, as we shall see.

Installing the Program

Wordstar 2000 arrives on six floppy disks: installation, conversion, program, dictionary, and two tutorial disks. You have to go through an installation procedure to move files around, and tell the program what sort of printer you are using and whether you have a colour or monochrome monitor. Installation is quite straightforward, and comprehensive instructions are provided both in the manuals and on screen. There is even a table f experienced computer users so they c skip the detailed procedures and get the program running more quickly.

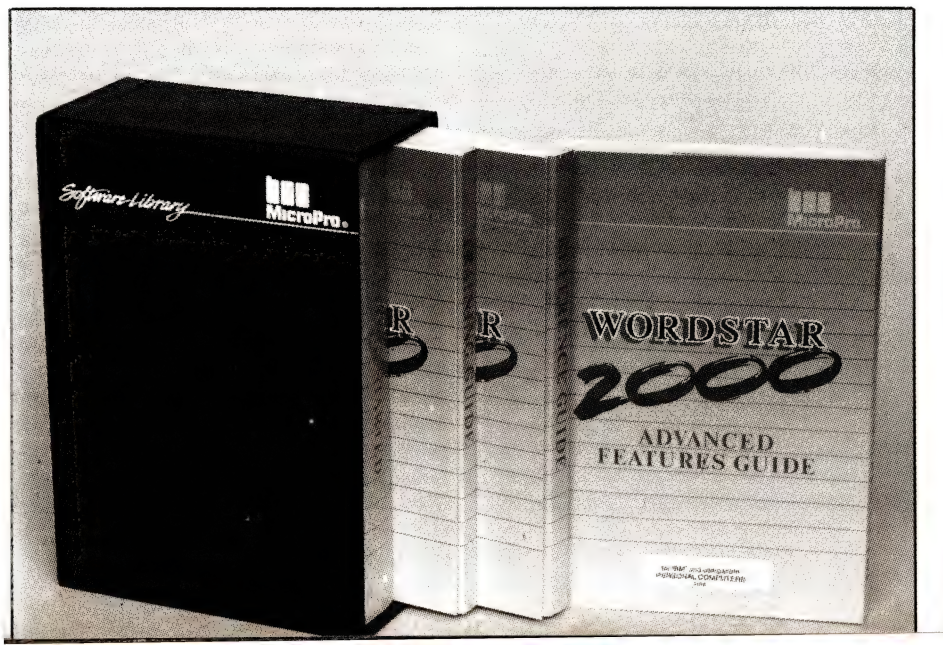
With floppy disks you must first start DOS with one disk in Drive A and, after DOS has loaded, replace it with the Wordstar 2000 program disk. With a hard disk system you have no such problem; clever programming and the use of a PATH statement let you access Wordstar 2000 from any directory.

Moving the Cursor

In a word processing program, moving the cursor is the most common activity, so you want to be able to do this in the simplest possible manner and with the greatest versatility. Wordstar 2000 shines here. All the IBM editing keys work as expected: Backspace deletes the character to the left of the cursor; Del deletes the character at the cursor; Ins toggles between 'insert' and 'overtype'; and the four cursor keys move one character left or right or one line up or down. There is one irritation: the up cursor lags behind the screen display, so you overshoot — by as much as a full screen — unless you judge it properly.

Wordstar 2000 has retained the cursor diamond on the main keyboard (↑E, ↑X, ↑S, ↑D, ↑A, ↑F) as an alternative to the IBM cursor pad. (If that last sentence doesn't make sense, forget about it; if you've never used the cursor diamond you'll probably want to start by using the cursor keys instead.) Other cursor movements are enabled either by a two-key control sequence or, for most commands, by using the cursor pad. The main combinations are listed in Table 1.

Users of the original Wordstar will▶



notice the control sequences are quite different from the old ones. They are all mnemonic — well, most of them — full marks to Micropro for trying. The only reservation I have about the selections is I think the Home and ↑ Home keys should be reversed, as should the End and ↑ End keys. Normal practice should be to use unshifted keys for small movement and shifted keys for larger movements. Moreover, I find much more use for going to the start or end of a line than going to the top or bottom of a screen. This change is easily made with Prokey (reviewed in *Your Computer*, June 1984). Here are the four macros needed in Prokey 3.0 or 4.0:

- <begdef> <home>' <ctrlhom> <enddef>
- <begdef> <ctrlhom>, <home> <enddef>
- <begdef> <end>' <ctrlend> <enddef>
- <begdef> <ctrlend>' <end> <enddef>

As a matter of interest, Microsoft Word uses identical keystrokes to the amended usage I have suggested. Wordstar 2000 already uses the Alt= and Alt- keys for special commands, so you also have to redefine these keys before using Prokey.

In a word processing program, moving the cursor is the most common activity, so you want to do it in the simplest manner and with the greatest versatility possible; Wordstar 2000 shines in this area.

The Bad News

Because all codes are now mnemonic, they won't be familiar to users of the old Wordstar; the cursor diamond is one of the few things they'll find unchanged. However, the program still retains the use of control keys, most with two-key commands, although some of the Mailmerge commands use three keys. The dot commands have been laid to rest and replaced by formatting controls or control sequences

The Good News

The documentation for Wordstar 2000 goes to great lengths to make former Wordstar users adapt quickly to the new program. Included in the Reference Manual are:

- Details of new features and functions
- A listing and explanation of commands on the main menu
- A chart comparing all commands in both programs
- Instructions on how to exchange files between the two programs
- What each command looks like after conversion

Function Keys

I've mentioned Wordstar 2000 uses the Ins, Del and Backspace keys and gives them the customary meanings. In addition, it defines 32 dedicated function keys: F1 to F10 unshifted and shifted, and the twelve keys on the top row of the keyboard (1-0, -, =) all alt-shifted. The functions available are well-chosen, although for some commands I use the control sequences and for others I use the function keys. I find it great to have several ways of invoking a command.

You can reprogram all the function keys if you wish. A keyboard overlay is provided which lists the function and cursor keys and their meaning.

Formatting

Wordstar 2000 uses format sheets to control commonly used formats. Five formats are supplied to give you a guide, but because they are set for the American page length of 66 lines you will need to change this to 70 lines when using A4 paper. Those supplied are JUSTIFY (right-justified text without page numbers), MEMOFORM ('From' and 'To' are entered automatically), MSCRIPT (double spacing, no hyphenation), NORMAL (justified with page numbers), and RAGGED (no justification). You can use these formats as is, modify them or create your own.

To use one of the existing formats, you enter Edit (E) from the opening menu and type a name for your document. The program then asks you "Format to use?" and you move the highlighting to the format you want. After you've saved the document, a copy of the format is stored with the document in a document file. To

Table 1.

Cursor to Block Beginning	↑ CA	
Cursor Beginning of Document	↑ CB	↑ PgUp
Cursor Down Screen	↑ CD	PgDn
Cursor End of Document	↑ CE	↑ PgDn
Cursor Home (top left)	↑ CH	Home
Cursor Left side of Line	↑ CL	↑ Home
Cursor Page Number	↑ CP	
Cursor Right Side of Line	↑ CR	↑ End
Cursor to a Character	↑ CT	
Cursor Up Screen	↑ CU	PgUp
Cursor End (lower left)	↑ CX	End

change an existing format, you simply type F from the Opening Menu, select the name of the format and answer the prompts. To change the format of an existing document, you select the name of the document instead of the name of the format.

Wordstar 2000 does all reformatting automatically. This includes adjusting page breaks as you change the text. If you don't like the way the program has set the page breaks you can set a page break wherever you want, and the program then repaginates automatically for the rest of the document. The program does not adjust for widow and orphan lines.

One of the flaws of the program is the way it handles tab stops; one command erases all tab stops, and there are two commands for adding or deleting tabs. Unfortunately, you can add or delete only one tab stop at a time; after adding or deleting one you are thrown back to the editing menu and have to select Tabs (↑ T) again. This makes changing a real pain.

Bits and Pieces

Worstar 2000 has a feature called Key Glossary, which enables you to store a sequence of up to 560 keystrokes in an entry, and recall it with an entry of between one and 15 characters. The concept is clear enough and has been used in Wang word processors and others for years. The authors of Wordstar 2000 have done their best to make a simple operation difficult by using confusing terminology: short forms and long forms and key files. Key glossaries are not recommended for maintaining standard legal paragraphs, but three other methods are explained.

Something like 120 printers were supported by Wordstar 2000 at the date of the latest listing — March 14. A sample file is provided to show you what each print enhancement looks like on the screen and how it prints out on your printer. I've had no problems with printing, except when trying to print the last page only of a multipage document — the program takes ages to move through the document until it finds the last page.

Results using a laser printer (I used a Hewlett-Packard Laserjet) are terrific. With a proportional font cartridge you can easily get proportional print and right justification, even with different-sized fonts on the same line. A few months ago I would have regarded this as impossible. I've found, however, that Mailmerge prints very slowly with the laser printer — about two pages a minute — and this appears to be the fault of the program rather than the printer.

Users of the original Wordstar will notice the control sequences are quite different from the old ones: most of them are mnemonic.

Wordstar 2000 can be extended to Wordstar 2000+ by adding three more programs: Telmerge, Maillist and Starindex. These so-called 'advanced features' are available on an additional diskette, which I didn't test.

Part of WS2000's configuration program puts a file called CONFIG.SYS on the DOS disk (if it isn't there already) and includes two commands, one of which is FILES=20 — so Wordstar 2000 can have 20 files open at the same time. The other is in answer to a question in the Installation Guide, asking "How can I increase the operating speed of Wordstar 2000?" This implies that it's slow. Nevertheless, I followed the suggestion that if you have enough memory you should put in a statement BUFFERS=20. This increases the number of buffers from the default of two to 20, at a cost of using an additional 10.3 Kbytes of memory.

I have rather a long AUTOEXEC file I run before starting up Wordstar 2000. Without the BUFFERS statement it took 54 seconds to load; now it takes just 13! The program itself takes 35 seconds to load. To move from the start of this review to the end took 30 seconds the first time; subsequent moves in either direction took 19.

On a floppy disk system the WS2000's speed is less than adequate; I could recommend it only on a hard disk system. In some operations such as 'locate' and 'block move' there is no indication of what is happening, so you're left wondering whether the system is thinking or has died. This lack of action also makes such procedures seem slow.

Other Features

Wordstar 2000 has a host of other features. Some are:

- You can UNDO your last deletion (unless you used Del or Backspace).
- You can use up to three windows, and they can contain two or three documents at the same time or several places in the one document.
- Four-function arithmetic, sort and merge are provided.
- There is a context-sensitive help system, accessed from F1.
- Screens can be displayed in monochrome or colour, and the colours can be changed if you don't like the default settings provided. Boldface and underline are shown as such on a monochrome monitor, or appear in different colours on a colour monitor. If you right-justify the text this doesn't appear on the screen, although it does display line endings at the proper point.
- Ruler lines are saved with the text.
- There are three levels of menu display: all menus displayed, submenus only or none. With no menus displayed, the status lines take up two lines, leaving 23 lines for text.
- A typewriter mode allows you to send text straight to the printer, either line by line or character by character.

Documentation

The documentation provided with Wordstar 2000 is superb. The package contains a Getting Started manual, an Installation Guide, a Training Guide, a Reference Guide, a keyboard overlay, a command card and a menu map.

The Getting Started manual contains detailed instructions on copying and preparing the disks for use, while some shortcuts are provided for experts. The Installation Guide provides some technical information on installation, use of DOS directories and path names and changing some of Wordstar 2000's defaults. Possible error messages which could be encountered during installation are included.

The Training Guide runs to over 200 pages, and contains 16 lessons on Wordstar 2000, Correctstar (the spelling program) and Mailmerge. The Reference Guide contains details of all Wordstar 2000 commands arranged in alphabetical order, with a good table of contents and a fine index, all of which help you locate the information you want quickly. Rounding off the Reference Manual is a set of program specifications, a list of error messages with details of what the problem is and the solution, things to consider when using Wordstar 2000 with floppy disks, helpful information on Wordstar 2000 for former Wordstar users, notes on exchanging files between the two Wordstar programs, in-▶

structions for creating data files for Mailmerge, a good glossary and the index.

The manuals are attractively designed, presented and bound, and are well laid out with plenty of examples. There are a few minor errors, some of which are corrected in a README file, which you can print out to find updated information.

Spellin Kerectly

The Wordstar 2000 spelling program, Correctstar, is good. The most commonly used words (9000 of them) are loaded into memory when you start the program. Another 56,000 are stored on the dictionary disk. This file can't be added to or amended. You can create personal dictionaries of up to 1500 words each and add or delete words at any time.

Correctstar provides the usual options: add to personal dictionary, correct as suggested, correct all occurrences, ignore suggestion, next suggestion, previous suggestion and type correction (sometimes when I typed in a correction I could only get it in upper case). Suspect words are displayed in context on a screen of fourteen lines. The program does not count the number of words in a document (Spellstar used to do this).

Correctstar can also be used from inside a document to check a word or a paragraph, or to check the rest of the document. You can also mark a section of text you want Correctstar to bypass. Despite this versatility, you can only run the spelling check in a forward direction, whereas the search function (Locate) can be run forwards or backwards.

Most spelling programs look at words alphabetically, so if you have the first letter of the word wrong, any suggestions from the program will be of no use. Correctstar goes much further than this and checks each misspelling phonetically — so it comes up with the right suggestions for kerectly and newmoneya.

Correctstar suffers when you use floppy disks; you have to leave the editing program and change disks to use it; so you lose the ability to check single words or paragraphs, which you can do interactively with a hard disk. Also, running the spelling program puts files on your data disk that consume 89 Kbytes. On a hard disk you can run Wordstar 2000 with 256 Kbytes, but to use Correctstar as well you need 330 Kbytes.

Hyphenation is frequently part of a spelling program, but in the case of Correctstar it appears to be separate. Automatic hyphenation is the default, but is rather restrained and doesn't seem to hyphenate many words. In this document, for example, it hyphenated about one word per screen of 22 lines. The Wordstar 2000 documentation gives no information at all on hyphenation, other than to explain how to turn it on or off.

In some operations, such as Locate and Block Move, there is no indication of what's happening, so you're left wondering whether the system is thinking or has died.

Tutors and Training

Two floppy disks containing eight lessons are provided with Wordstar 2000. The first four are on basic word processing, while the others are on correcting spelling, creating mailing lists, merge printing and creating indexes. Each lesson takes about 15 to 20 minutes to complete, so there isn't time to do much more than scrape the surface of the subject. Nevertheless, they are well presented and form a useful introduction. They are also entertaining; it's quite some time since an answer from a computer caused me to laugh out loud.

The program is easy to learn, although memorising the less frequently used commands could take some time. Once you are familiar with the opening menu, you should have little trouble finding a particular command. If you decide not to use the Training Guide, at least take the time to look at the Test Yourself multiple-choice questions at the end of each lesson. If you don't find them funny you'd better take a spell from your computer!

What's Left Out?

What is there that Wordstar 2000 can't do? You can right-justify text and specify proportional printing — correct lines are displayed in both modes — but the program won't line up text on the right margin, as you might want to do to print the date.

It will handle footnotes and automatically renumber them, but will print them only at the end of the document, not at the bottom of each page. It doesn't handle tabbing too well. It's too slow for a floppies-only system. Otherwise, I'm pushed to find any omissions.

The only problems I encountered with the program were minor: the speller occasionally refused to change a word after I'd typed in a correction; once 'word' was hyphenated with 'w' on one line and 'ord' on the next; and a small part of one tutorial (Use a Key Glossary) wouldn't run.

I have read complaints that if you remove something from one line, it doesn't always wrap back a word to the line above. While this is true, it is easily fixed by going to the end of the line and deleting any spaces at the end till it wraps back.

Prices

Wordstar 2000 costs $595 (recommended retail price) and Wordstar 2000+ is $725. Users of Wordstar can upgrade to Wordstar 2000 for $300 or to 2000+ for $365. See your dealer on how to go about the upgrade.

Would I Buy this Program?

My experience with Wordstar (3.3) has been limited, but I would never consider buying it, even at its new reduced price. Wordstar 2000 has overcome my objections and I believe it is a fine program. Highly recommended. □

PRODUCT DETAILS

Program:	Wordstar 2000 Version 1.01
Made by:	Micropro International Corporation
Hardware required:	IBM PC/XT PC DOS 2.0, 2.1, 3,0; 256 Kbytes of RAM (320 Kbytes with DOS 3.0); a minimum of two floppy drives (hard disk recommended).
Best points:	Simple to learn, simple to use; chock full of features, supports most printers.
Worst points:	Too slow unless hard disk or RAM disk used.
Price:	$595
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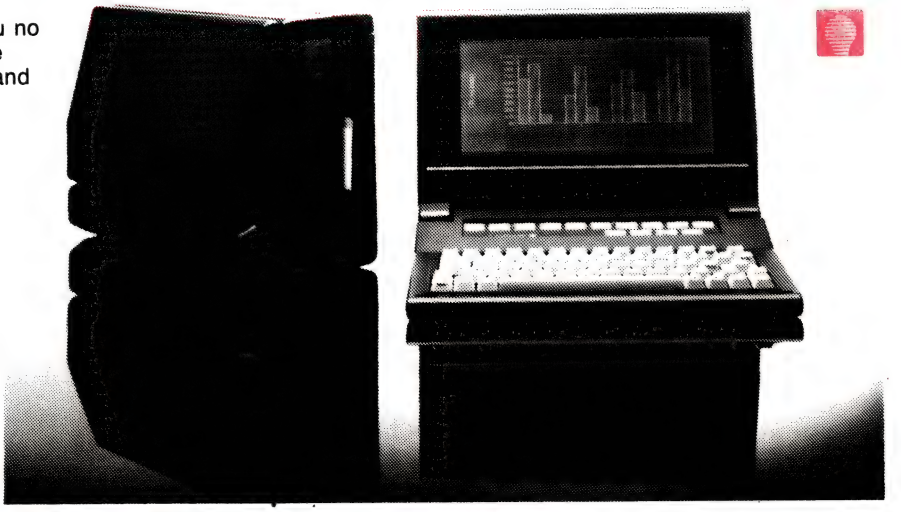

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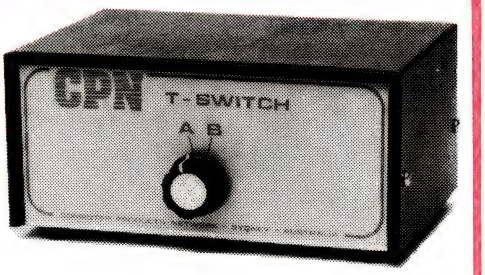

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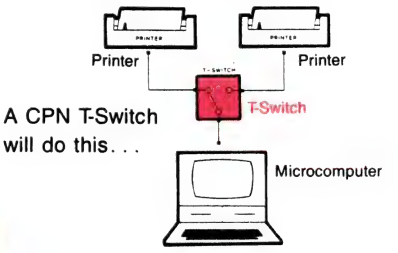

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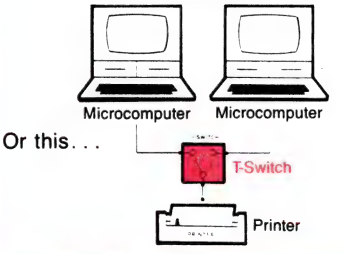

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Dashing through the malls with an off-course open trolley.

Just Dreaming

Since starting this column I've received several letters from Lindsay Ford, of Dreamcards fame, as well as some programs for review.

Now let me say at the start, I have not been a Dreamcards fan: I saw some of the company's early efforts, Cheapie and Duo 1 and 2, and was put off by their very poor quality. I'm happy to say these have now been deleted from the catalogue and the latest programs are a great improvement.

The first package I looked at was 'Merlin', a 32 Kbyte BASIC adventure which comes with its own 56-page booklet giving a complete listing and detailed explanation of the program. The program is good, with a variety of situations and help available for emergencies. One of a range of titles which indicate your skill (and luck) at solving the adventure is bestowed upon you at the end of the game.

I recommend this program, and although it may seem expensive at $27.95, it's still much cheaper than most others. Merlin plays differently every time, and you get a book and some terrific hints into the bargain.

If you're looking for a cheaper adventure you could try Duo 6, which includes two different adventures on one tape for $19.95. Each side of the tape has a separate introduction, followed by three dumps of the main program. One program, Yeti, starts with a good graphic section, while the other side contains Fallout Zone. Both adventures are fairly standard, with objects to collect and use along the way, and are suitable for 16 Kbyte and 32 Kbyte Microbees.

Barmoth is a more complex adventure, which requires a 32 Kbyte machine and costs $19.95. There are many different situations in this program, so you could probably use a pencil and paper to jot down a few pertinent details along the way.

For something completely different try Bushwalking Adventure. This comes with a detailed map showing your starting point and objective. You have to use your skill and wits to decide what to take along, where and when to camp, how to make a bridge, and so on. This program also costs $19.95 and is especially useful for groups of players, such as a gathering of scouts.

For the Arcade Gamesters

Mine Drop is one of the very few arcade games available from Dreamcards. It's a good shoot-em-up-in-a-maze-type game, with excellent graphics and sound.

Compu-B is in a completely different vein. Designed to help you pick the winners in race meetings, this program comes with an informative booklet explaining the data required. As the manual says, the program doesn't guarantee to pick every winner, but it does manipulate a great deal of information in a short time to predict the most likely outcome. If any readers have used Compu-B, I'd like them to write in about their experiences (I'll protect your identity if necessary). Compu-B costs $39.95 and will run on 16 and 32 Kbyte systems.

Several smaller companies have also written to me with details of their programs, which I'll mention in months to come. Just briefly, I received some sample adventures from Platypus Programs of 27 Harris Street, Redbank Plains. The two I saw were double-loading programs with introductions which could be read while the rest of the program was loaded — a great idea. The input parsing was rather slow and all responses had to be typed in lower case, but adventurers would probably be happy to overlook these slight disadvantages. The programs released so far are Dragon's Lair and Suzerain Moidemaeme (whatever happened to short snappy titles?), at $14 each. Two other adventures, Forbidden Zone and Cobra Quest, cost $12. Some idea of the complexity of these adventures can be gathered from the fact that each requires a 32 Kbyte Microbee.

One program which looks quite remarkable is a word processor with the ability to dump PCG graphics (on a dot matrix printer, of course), called Beetex. This is available from Dr Alain J. Remont of 51 Finniss Street, North Adelaide. The cost is $125, which includes a comprehensive manual. This program needs a disk system and you must specify which disk system you have. Apparently the PCG characters are not limited to the usual 128, as the program can reload data for new PCG characters as the text calls for them. The samples were most impressive. However, a very complex setting-up procedure is required to get around the program's complicated copy protection; you have to dump certain files, under program control, onto a second disk, then insert that disk and the original into the Microbee in turn! I tried this several times and read all the documentation, but couldn't get the program to run at all. I'm assured the disks which were sent were okay, so I suggest you get an assurance that your money will be refunded if you can't get the program to operate. Perhaps some tertiary qualifications would help.

While on the subject of word processing, it seems almost half of all Microbee users have upgraded to the Computer-In-A-Book series. Several users have asked if it's worth spending the money to get the Wordstar group of programs instead of using Wordbee, which comes with the system. After using both programs, I recommend anyone doing a lot of word processing to upgrade to Wordstar, especially at the bargain basement price: for just $169.50 you get Wordstar (both preinstalled for the AT daisywheel printer and an uninstalled version), Winstall (so you can set Wordstar up for your particular printer and work), Mailmerge, Spellstar and Starindex. In addition, you receive manuals for the above programs (except for Winstall) and the Wordstar reference manual. To clinch the deal you have to send in your money, along with your registration certificate, and the programs will be mailed out to you within a week or two. User group members even get a discount on that low cost!

A very wide range of programs is also available from most user groups; I know the Sydney group has at least 15 disks full of programs, including CP/M public domain, Microsoft and Microworld BASIC material. The Canberra, SA, WA, and Victorian groups also have programs available on disk and cassette.

I'll try to cover more details of the Computer-In-A-Book in the next column. □

BY JOHN HEPWORTH

HOW MANY PC buyers have hummed the tune 'eeny, meeny, miny, mo' (or one very much like it) to themselves as they tried to buy a PC? Wasn't it frustrating trying to decide if high-resolution text was more or less important than colour, graphics and games?

In the beginning IBM set two standards for PC video boards and monitors. The IBM mono monitor/mono video board combination gave beautiful high-resolution green-screen text, but no graphics or colour, while the colour board and an RGB monitor provided adequate graphics (in four basic colours), allowed users in the United States to connect their NTSC colour television set to their PC, and gave barely adequate text resolution.

Lots of video board manufacturers jumped onto the colour graphics board bandwagon when designing the huge number of multi-function boards on the market. A smaller number addressed the problem of getting graphics onto the IBM monochrome monitor, either emulating the colour graphics standard and translating on the run for the IBM mono monitor like the STB Chauffeur, or by using their own protocol to add graphics.

And Then There Were Five

More recently IBM itself has taken the number of industry-standard video protocols to five, with the release of the Enhanced Graphics Adaptor (and monitor), and the Professional Graphics Adaptor (and monitor).

Why do I say five industry video standards when IBM specifies only four and there are dozens of different boards with their own protocols? My definition is as follows: if more than one hardware manufacturer is building boards for that video protocol and if software is written for 'it', the industry has accepted 'it' as a standard. Users are reasonably safe choosing such standards.

So what are the five video standards?

All the software I've come across supports both the IBM monochrome (in text mode) and colour graphics standards. On the day it was released in Australia, the Professional Graphics Adaptor displayed the most glorious CAD images from Autocad, as well as images which looked like the front cover of the most glossy magazine imaginable. An accepted standard at birth.

The Enhanced Graphics Adaptor can emulate the colour graphics adaptor with normal RGB monitors, adds high-resolution colour with the IBM Enhanced Colour Display and implements graphics on the IBM mono monitor.

The fifth standard is the protocol pioneered by Hercules on the Mono Graphics card to put graphics onto an IBM mono monitor. Also used by AST with the Mono Graph Plus and the Tseng Ultra Pak (in this case giving compatibility with programs written for the IBM colour graphics board as well), the Hercules protocol is supported by a wide and ever-increasing range of software.

Industry Standards

The Enhanced Graphics Adaptor and the Hercules protocol have been independent!y identified as standard protocols by a game! Yes, the famed Microsoft Flight Simulator has been updated and in version 2.12A will run on the IBM colour graphics cards (and thus most multi-function cards), the Enhanced Graphics Adaptor in colour, emulate and mono graphics modes, and on cards embracing the Hercules protocol.

Software rewritten for the EGA will undoubtedly rush onto the market, while software compatible with the Hercules protocol includes Autocad, Graphics Toolbox (a collection of graphics support routines for Turbo Pascal), Lotus 1-2-3, Enable (an integrated package to challenge Symphony), TESS (a Terminal Emulation Software System) and many more. The only fly in the ointment is BASIC. Running BASIC in non-graphics applications on the Hercules protocols is simple; graphics applications require an extension to BASICA called HBASIC which allows most (but not all) BASICA graphics software to run.

Many boards which put graphics onto the IBM mono screen with their own protocols trumpet the fact that they're 1-2-3 compatible. This often means the software driver needed for Lotus is included with the board, while other graphics software may not support or be supported by such boards. With the acceptance by the hardware and software industries of the Hercules protocol as an alternative to the four IBM standards, it's become a mature protocol and a safe choice.

Microsoft has an update policy for users with versions of Flight Simulator prior to 2.12A. The upgrade is free if the old version was purchased after July 15, 1985, and $25 if purchased before that date; contact Microsoft on (02) 452 5088. Graphics Toolbox and other Turbo Pascal products are available from PC Extra: (02) 319 2155. Enable is from Optsoft: (02) 624 8140.

Repeat After Repeat

Ever used TYPE to display a file on the screen? Ever tried to use TYPE *.DOC to display all your .DOC files one after the other? Didn't work, did it?

Lots of programs, including some DOS commands, don't recognise wildcards in filenames. In July's 'IBM Underground' I mentioned an essential little program called Alter which, unfortunately, didn't use wildcards. But DOS has a little-known batch sub-command called FOR which makes it possible to emulate wildcards with programs which don't internally support them. Below is a batch file I call REPEAT.BAT which uses FOR to exploit wildcards.

Use your word processor to create a file named REPEAT.BAT containing just this one line:

```
FOR %%A IN (%2) DO %1 %%A.
```

If you want to TYPE all files with .DOC extensions, the syntax is:

```
A> REPEAT TYPE *.DOC
```

DOS takes the first parameter after the batch filename and replaces every %1 in the batch file with it; DOS also takes the second parameter after the batch filename and replaces every %2 in the batch file with it. In effect, DOS sees the combination of 'FOR %%A in (%2) DO %1 %%A' and 'REPEAT TYPE *.DOC TYPE' as 'FOR %%A in (*.DOC) DO TYPE %%A'.

DOS now works through the list of files it can find which match *.DOC and turns it into a list of commands like:

```
TYPE 1ST-FILE.DOC
TYPE 2ND-FILE.DOC

.....
TYPE LASTFILE.DOC
```

REPEAT can be used for other functions and with different combinations of filenames; just remember the syntax is:

```
A> REPEAT function filenames
```

REPEAT can be customised to add extra functions to suit the individual user's needs. DOS directly allows up to 10 replaceable parameters (including the name of the batch file), and using SHIFT extends even this number. The power of DOS commands is vast, though the DOS manual explains some commands poorly. REPEAT.BAT gives sample use of FOR to help you discover the possibilities of this little known DOS command. □

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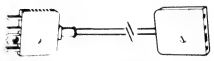

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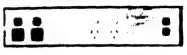

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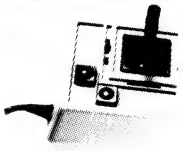

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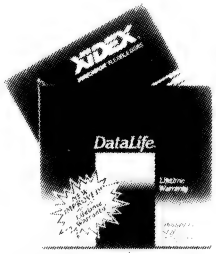

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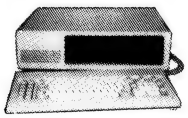

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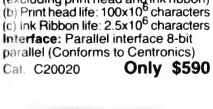

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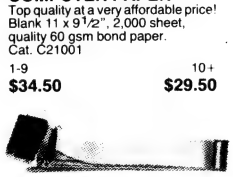

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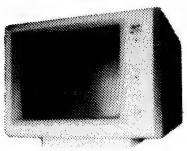

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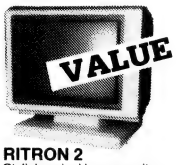

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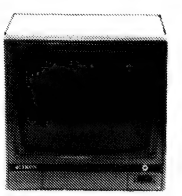

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Errors and Omissions Excepted.

BY JOHN HEPWORTH

HOW MANY disks do you have — 10, 50, 200? Where is that file called PAYROLL.DAT you need *right now*?

It would take hours to load each disk into a drive one after the other and do a DIR, so how about an easier way? You could (and should) label each disk, but a label saying 'Miscellaneous Junk Utilities' might mean something when written, and be meaningless later.

COVER is a PC-DOS utility, which sorts and formats disk directory data and prints it to fit inside the disk envelope — all you have to do is cut out the printed listing.

COVER runs under DOS 1.x and 2.x, and should be okay under 3.x. Any normal hardware configuration should work, although, as written, this utility does expect to be talking to an IBM or Epson MX80 printer (or equivalent). It can easily be modified to apply to any printer that offers 'condensed' print and spacing of eight lines per inch.

COVER comes as a group of files: COVER.COM is the ready-to-execute program for the default Epson printer, while COVER.DOC holds the documentation. Source code is provided, which should always be the case (but rarely is) with public domain software, so modifications can be made to suit different printers. Written in Assembler, COVER uses no macros, so either ASM or MASM can be used to assemble the source code. The source files are COENDP.ASM, COFREE.ASM, COPRNT.ASM, COSCAN.ASM, COSORT.ASM, COTITL.ASM and COVER.ASM. A batch file (COFIX.BAT) takes care of the linking process with the aid of a control string found in the file COLINK.

ASM (or MASM), LINK and EXE2BIN are required to assemble and link the code, but only if modifications to the source are required.

Limitations

COVER ignores hidden files and files in sub-directories. Since the 'path' logic seems to be aimed primarily at fixed disks and this utility is directed towards diskettes, these limitations shouldn't effect the majority of users.

Operation

From the DOS prompt type <COVER> for the drive containing the disk to be listed. The single character input is first checked for an 'Escape', and the drive character is verified for a 'legal' drive designator. COVER then determines available free space on disk, loads all directory entries into an internal stack and sorts the stacked entries. It also sets the printer to eight characters an inch, 44 lines a page and compressed mode.

```
Printer (1.1) - Special Print Functions
0   -  Set Printer to Power Up Mode
1   -  Compressed Print
2   -  Italics Print
3   -  Emphasized Print
4   -  Double Strike Print
5   -  1/8th Inch Spacing
6   -  Turn on Paper Out Sensor
7   -  Turn off Paper Out Sensor
8   -  Double Width Print #1
9   -  Double Width Print #2
Esc -  Exit

Change another setting?
Option 0 done!
Option 1 done!
Option 2 done!
Option 3 done!
Option 9 done!
```

Figure 1 A *sample screen from* PRINTER.COM.

If an <escape> is pressed, COVER forces a page restore to complete the current listing, resets the 'default' drive to its value on entry, conditionally forces out one more 'page' to restore the paper to the true top of the form, then resets the printer to power-up status.

The user is prompted to type in a title (40 characters are allowed and null titles are permissible), and the program adds the pre-computed free space available on the disk and places the ASCII decimal result in the title line. Four columns of file names will fit within the available space. A neat label is printed with an outline to cut around, so the finished product will fit inside a disk envelope.

COVER was written by Dan Daetwyler, Route 5, Box 518A Springdale, Arkansas 72764; 501-756-0212. It should be available on most bulletin boards, at least as the ready-to-run COVER.COM. PC-SIG disk #184 (available from most user groups) has all the source files.

Printer

Every printer has the ability to vary pitch, line spacing, font, or other characteristics. Some allow control of these functions from switches on the front panel, and most allow software to send control codes from the computer to the printer.

That's fine if you're using one of the major software packages in which these codes are incorporated, but what if direct user control of the printer is required? You could load BASIC, LPRINT the commands, exit BASIC, and run the function — a great method for the hacker, but no good for the novice.

PRINTER.COM solves the problem. If you type PRINTER at the DOS prompt, a menu with 10 options numbered from 0 to 9 and a one-line description of each function is displayed. (The sample for an Epson is shown in Figure 1.) Pressing any key sends the corresponding codes to the printer and returns to the menu, while pressing <escape> returns to DOS.

PRINTER reads the description (and accompanying control codes) from a data file called PRINTER.DAT. The line in the PRINTER.DAT file which changes the mode on an Epson printer to double strike is:

Double Strike Print$027071

The string to the left of the dollar sign is the one-line description of the command which will be shown on screen, and the 027071 tells PRINTER to send character number 27 (decimal) followed by character number 71 to the printer. This allows instant modification to the one-line description and to the codes attached — if only COVER had used the same system. □

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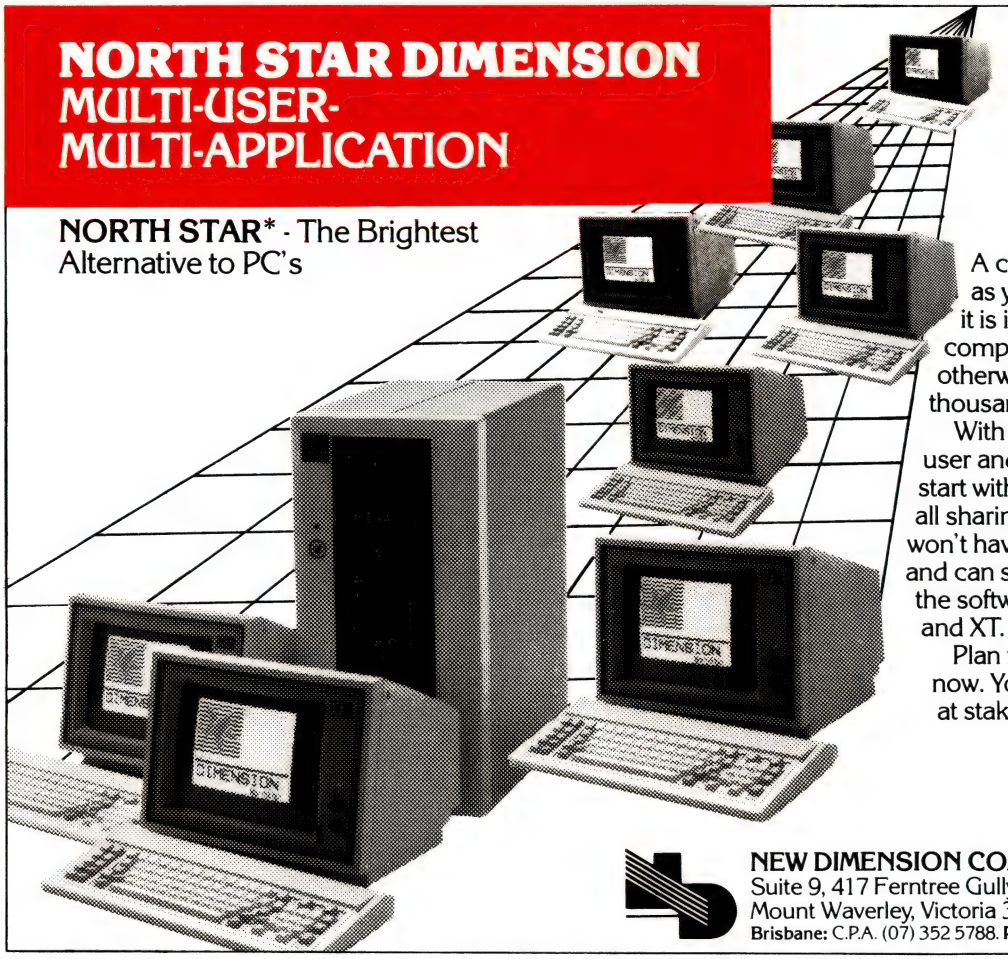

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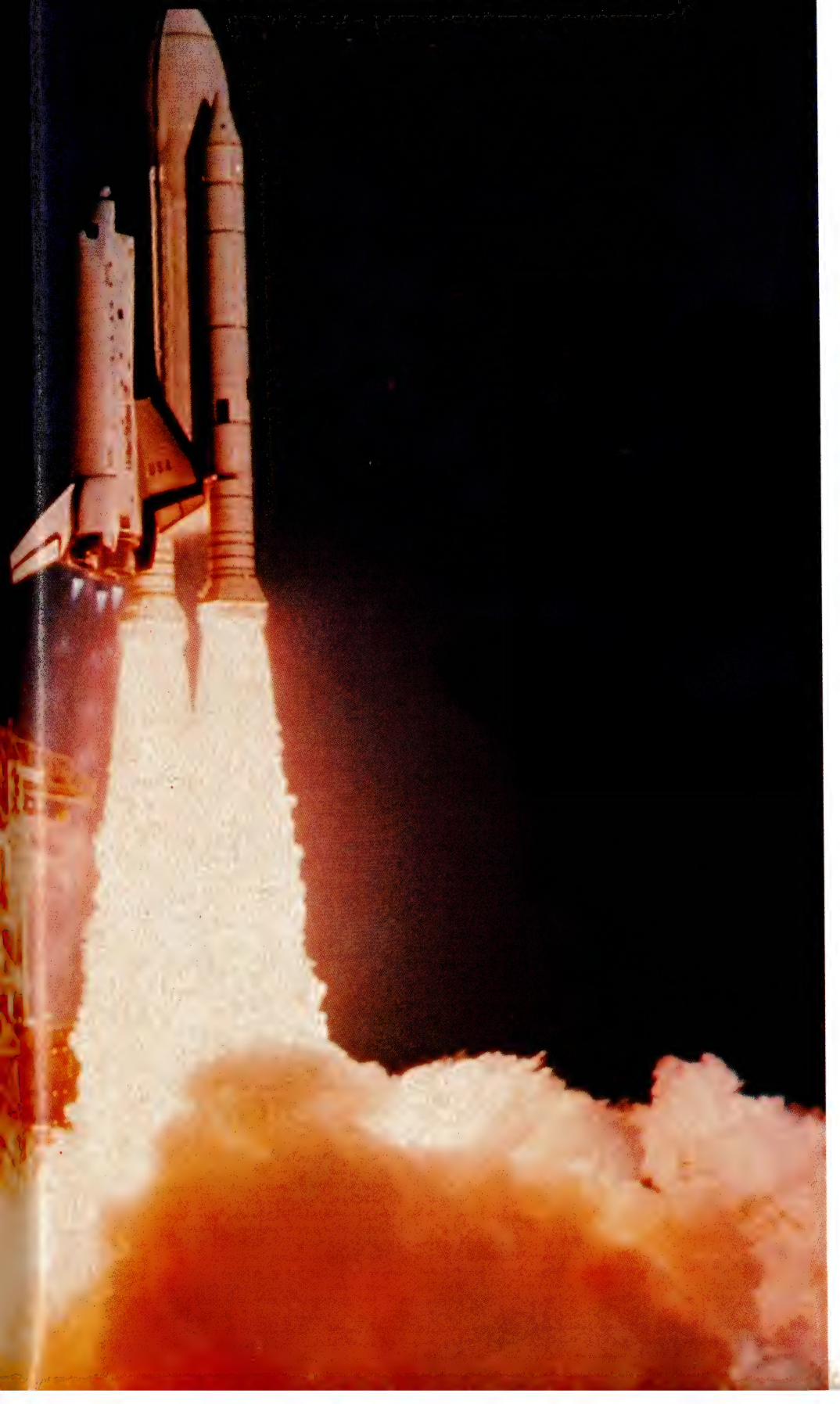

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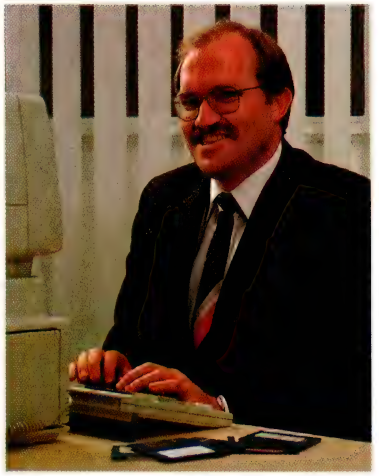

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The Fortunes Of Commodore

If you've been watching the press over the past couple of months you've probably noticed a trickle of gloom and doom reports concerning Commodore, coupled with rave reviews of that company's new wonder computer, the Amiga, now released in America.

To the casual observer these reports seem contradictory: Commodore is renowned for its ability to shift product, and if the Amiga really is a world beater why would the company be in bad shape? Perhaps I'm a cynic, but I'm beginning to suspect there's more here than first meets the eye.

Keep in mind that 1985 has not been a good year for the computer industry as a whole: the market has been slow across the board, affecting just about everybody, and some of the smaller outfits have gone to the wall. Sinclair seems to be working through financial troubles and even stayers like Apple have closed plants and laid off staff. (Almighty IBM merely revised its profit forecasts downwards.) At times like these, the last thing any manufacturer wants is more competition.

Commodore is undoubtedly the most cost-efficient computer manufacturer in the world. The company owns chip manufacturer MOS technologies, so it has an edge in price and delivery on many components, as well as an advantage in the sheer volume of it's outside orders. When Commodore buys components it buys in such bulk it obtains discounts no competitor could match, and it's worth remembering that, apart from the chips and the processors, 90 per cent of the components inside an Apple Macintosh or an IBM PC are identical to those in a 64. All computers have RAM chips, LEDs, power switches and so on, and Commodore buys more than anybody else (including IBM). It stands to reason if Commodore entered the business market it could undercut everyone else.

Jaws IV?

Commodore refined its efficient manufacturing techniques over several years in the lean, cut-throat home computer market. In contrast, manufacturers of business machines have operated on a much higher profit per unit basis. Should Commodore decide to make a serious attack on the much fatter business market, it could well be like a shark picnicking at a beach in summer. The attack will come in the form of a lower-priced machine, but price alone doesn't make a killing ... however, if that same low-priced machine were also far more powerful than anything else available, the competition would receive a blow on two fronts. The machine is the Amiga and it must be causing concern.

This brings us to the gloom and doom reports, some of which are obviously suspect. One quoted "industry analysts" as saying the Amiga was "too advanced" to have any application in the office: office workers wouldn't need or know what to do with its extra power! That's reminiscent of the experts who said similar things about the Apple II before Visicalc came along!

But let's stick to the more factual comments. Commodore is said to have suffered a 50 per cent drop in sales and to have laid off 15 per cent of its staff, and the failure of the Plus-4 must have cost heaps. Commodore posted a loss of US$80 million in the last quarter of '84/'85 (with one report claiming this might reduce the company's net worth by as much as 25 per cent). Other critics claim Commodore's marketing policies have emphasised the mass retailers at the expense of their computer-shop dealer network — the implication being you can't sell business computers in K-Mart, no matter how good they are.

As I said, maybe I'm a cynic, but criticisms about net worth and dealer networks do seem a little too coincidental with the present market situation. Of course I'm just speculating, but is it possible that someone is trying to talk Commodore down? Or are there grander plans: a takeover, perhaps (a good reason to talk the stock down)? There are certainly plenty of companies which could benefit from acquiring Commodore's efficiency as well as the Amiga itself; if you can't beat 'em, buy 'em. For starters, Jack Tramiel would have an obvious interest, but does he have the cash? Apple and Commodore could make an interesting combination: two pioneers joining forces to battle Big Blue. IBM itself would seem an unlikely contender, but stranger things have happened. As I say, it's only speculation, but who knows — the next few months might well prove particularly entertaining.

Easyscript and Proportional Type

A few months ago I bought a CBM DPS 1101 daisywheel printer. It's quite a solid and capable unit, but it suffers from a 'jinglish' manual. It's capable of bi-directional proportional printing, and although Easyscript didn't appear to support PS printing I've just discovered a way of making it work; if you're using a non-Commodore printer with PS capabilities, you might be able to apply my method, too.

There's an old saying at *Your Computer*: "When all else fails, read the manual", which isn't so easy with the DPS manual, but I persevered. Printers respond to certain control codes, which are usually built into your word processing program, so you don't need to know about them. Sometimes, however, the printer has features your word processor doesn't accommodate, in which case you need to consult both manuals. The trick is to learn what codes the printer requires to activate a certain function and also how to send that code from your word processor — in this case Easyscript. It's really a cinch when you know how!

In the case of the DPS, the control code to turn on PS printing is ESC P. From Easyscript you press F1, then ↑ (you should see a reversed E), then type P and Return. To turn it off hit F1/↑/Q Return.

The F1/↑ sequence sends the ESC(ape) character, which informs the printer that what follows is a command. This is fine if you're sending a command which is an alphabetical character, but if it's a numeric code of more than one digit Easyscript has 10 definable characters, 0-9. To use them you press F3, which puts a reversed asterisk on the screen and then x=y (where x= the character number you are defining (0-9) and y= the command value), for example: *0=12:1=11:2=63). Finally, you use F1/↑0 to send the command you have defined.

In proportional mode Easyscript won't right justify correctly, but everything else seems to work just fine. With the DPS you can also make the platen roll backwards, so you can print a page in two columns.

Easyscript now retails for around $30 and has to be one of the best value-for-money word processors available. □

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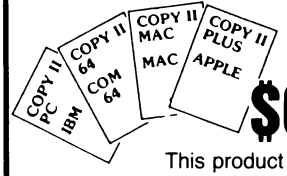

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Why Spend a Pile on a Compiler?

There's no doubt about it, BBC BASIC is much faster than that on the commonly used on 8- and 16-bit micros, but the lure of the machine code's speed is hard to resist (some people even used to buy this magazine for Les Bell's articles on the subject).

Assembler is easier to use on the BBC than it is on most machines, thanks to the BASIC's built-in assembler, but it's still a tedious task. Wouldn't it be wonderful if the computer could translate BASIC into machine code?

Of course it already does: a set of machine code routines is kept (for safety) in a protected part of the memory, and the interpreter program, starting with the first line of BASIC, uses an appropriate subroutine to carry out the commands and functions in each statement. A library of subroutines (many of which use other subroutines stored in the operating system ROM) sits in the BBC's 16 Kbytes of BASIC ROM. With 32 Kbytes of machine code ready for action, BASIC is a fairly straightforward language to use.

The drawback is the relative slowness of having to analyse each line of BASIC. The obvious solution is to do all the translation before running the program, using the computer to do the hard work. A compiler program analyses statements written in BASIC, Pascal or whatever and translates them into another code. Sometimes the code produced is not the usual machine code, but a 'pseudocode' which needs a library of subroutines for support when it's time to start work. These are usually stored in a ROM, a technique used by the Oxford and Acornsoft versions of Pascal. A full compiler such as ACK's produces code which contains its own 'library', and a section of code is included to perform every BASIC command. You don't need a Mensa-standard IQ to be able to identify at least one problem with this method.

The ACK Compiler (purchased from ACK Data in Nottingham, England) is fairly complete, allowing the use of all but 11 of the BBC's 123 BASIC keywords. Users are restricted to the use of 52 integers less than 65,536, so trig functions, along with EVAL, EXP, INT, LN, LOG and USR are obvious omissions. Strings must be declared at the start of each program.

It must be almost impossible to use on a tape system, but the disk version is friendly, with an excellent report generator and plenty of on-screen messages to let you know what's happening. The cost of importing it from the United Kingdom is about $60. Although the 30 pages of documentation are adequate, a run through a spelling checker wouldn't hurt. Unlike several other BBC compilers, the ACK compiler supports PROCs and FNs as well as arrays.

The warnings in the handbook that compiled code takes from two to five times the space of the BASIC code aren't an exaggeration, and it's also reluctant to analyse any but the simplest expressions and multi-statement lines. However, after slogging for hours to get a graphics demo together, it was clear that it certainly sped things up. Sixty dollars seems a lot to spend on speeding up this sort of program; anything long enough to be useful is likely to turn into a RAM-eating monster.

Help Wanted

I'm compiling (sorry!) a list of all BBC user groups and bulletin boards in Australia and New Zealand for publication. Please send in any information to PO Box 61, North Quay 4000, as soon as possible.

The Queensland Users' Group, QBUG, is currently setting up a bulletin board in Brisbane and would like to share ideas with other groups engaged in the same sort of diversion.

I've also had requests for information about receiving weather satellite pictures using the BBC as a display and storage device. All the information I have concerns the European scene, so if anyone can provide any details at all I'll certainly pass them on.

Dual-Screen Modes

A few months ago I mentioned a technique for displaying two screen modes simultaneously, but there wasn't room for the listing which should have accompanied the text. If you'd like this listing, send a SAE to the PO Box mentioned above. □

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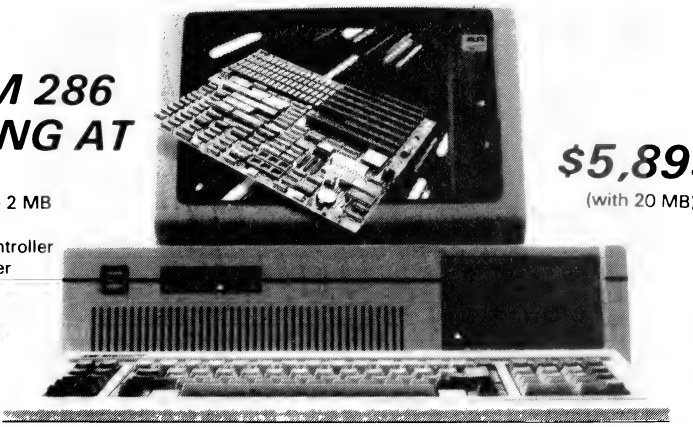

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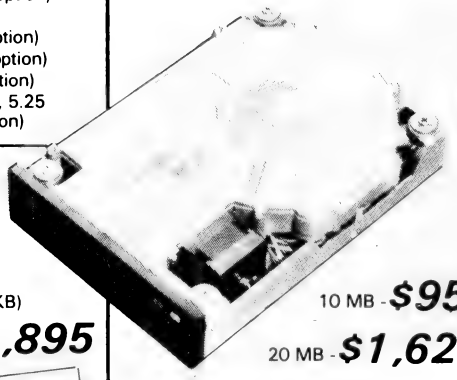

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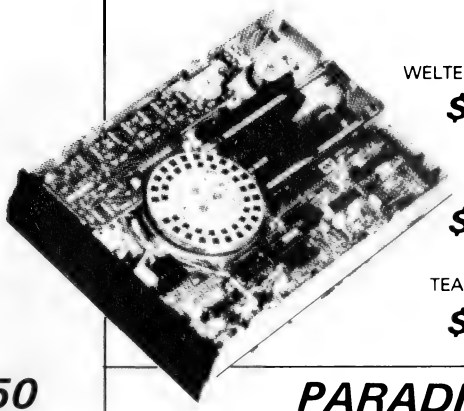

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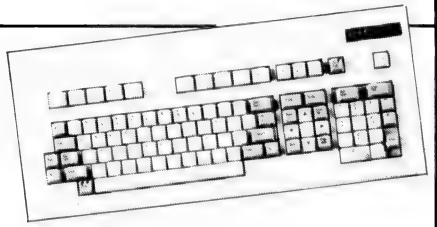

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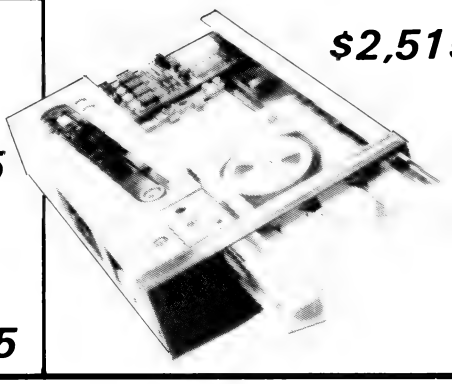

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BY JEFF RICHARDS

Selecting Your Own Cursor Shape

This month I have another small assembly language program for you to try, which, like many assembly language routines, performs a task seemingly out of proportion to the simplicity of the program — an example of how even assembly language programs can be made understandable with the careful use of labels.

The function of this program is to permit you to modify the cursor to the style you prefer. By writing certain control codes to the video controller chip it's possible to alter the cursor from the present flashing block to a variety of different styles, both blinking and non-blinking.

The cursor shape and characteristics are controlled by writing data into registers 10 and 11 of the video controller chip. You can access these registers by writing the required register number to the controller address port (10h in the Bondwell). When the required register has been selected, data is written into it by sending the data to the Bondwell port number 11h.

Register 10 controls the scan line at which the top of the cursor is to be placed. The scan lines are numbered from 0 to 8, representing the nine rows of dots which make up each character space. If you specify a start line number of 0, the top of the cursor will appear immediately under the line above, while if you specify a start line number of 4 the top of the cursor will be in approximately the middle of the character.

This register also controls the cursor blink rate. The cursor can be set to a slow blink, fast blink or non-blink, or be removed completely. The values which are used are listed in the program, and must be added to the start line number you select.

Register 11 is used to select the scan line at which the bottom of the cursor is to be placed. Obviously, this must be equal to or greater than the line number of the top of the cursor. A top line number of zero and a bottom line number of 8 will give the familiar large block; a top of 7 and bottom of 8 will give a thick underline, while a top and bottom of 8 will give a thin underline.

```
ADDR    EQU     10H     ;port no  for controller register
                        address
CNTRL   EQU     11H     ;port no  for controller data
CSR1    EQU     0AH     ;register no  for cursor top
CSR2    EQU     0BH     ;register bi, for cursor bottom
NOBL    EQU     00H     ;value for no blink
NOCSR   EQU     20H     ;value for no cursor
FAST    EQU     40H     ;value for fast blink
SLOW    EQU     60H     ;value for slow blink

C1      EQU     NOBL+8  ;no blink and top at line 8
C2      EQU     8       ;bottom at line 8

ORG     100H
        MVI     A,CSR1  ;select cursor top register
        OUT     ADDR
        MV1     A,C1    ;and write the data
        OUT     CNTRL
        MV1     A,CSR2  ;select cursor bottom register
        OUT     ADDR
        MV1     A,C2    ;and write the data
        OUT     CNTRL
        RET
```

Listing 1 *Cursor definition program.*

```
1000 C1=8
1010 C2=8
1020 OUT 16,10
1030 OUT 17,C1
1040 OUT 16,11
1050 OUT 17,C2
```

Listing 2. *The* BASIC *version.*

Listing 1 is a program which will set the cursor to the required shape and characteristic. C1 controls the top line number and the blink rate (or non-blink or non-display), and C2 controls the bottom line number. In Listing 1 they're set to give a non-blinking thin underline. Only these two values should be altered if you want a different cursor style. For a thick underline with slow blink, for example, use C1 EQU SLOW+7 and leave C2 as is.

This program is also a good demonstration of how useful labels and equates are in a assembly language program. It's not necessary to know anything about the actual program in order to be able to alter it for specific purposes; by simply redefining a label and reassembling the program it can be made to function as required.

In this case, we've reached the admirable situation of having more lines of definition than executable code!

The program should be entered into a file called, say, CSET.ASM, using the non-document (N) mode of Wordstar. Move it onto your CP/M disk number 2 and type MAC CSET to assemble it, then type HEXCOM CSET to create the executable file CSET.COM. This file can then be moved to your working disk and executed by simply typing CSET, and it could be included in your auto startup file (PROFILE.SUB) as the one-line command CSET.

The same procedure as shown in Listing 2 can be used for Microsoft BASIC, and I expect it would be similar for Nevada BASIC. □

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BY KATE STOREY

A Child's Guide to the Amstrad Micro
A Child's Guide to the Apple Micro
A Child's Guide to the Commodore 64
John Dewhirst and James Ryan
Cambridge University Press, $10.95
These must be the cutest guides to computing I've seen. The three slim paperbacks are divided into five chapters, each written by 'an expert' in his or her field. The introduction is presented in letter-format, signed by each of the 'authors' and accompanied by black-and-white caricatures. The books aim to "show you not just what the computer can do, but more importantly, what *you* can make the computer do for you." Starting with how the various keys of the computer work, the guides show children how to use the computer, how to write their own programs, how to draw pictures on the screen and make the computer play music, and how to use the reference sections. The print is large and clear and the accompanying sketches help make these books enjoyable to read.

The Illustrated Supercalc 3 Book
Guy Pegues
Prentice-Hall, $33.95
This book has the novice immediately setting up spreadsheets, performing calculations and graphing results, while the more experienced Supercalc 3 owner can use it for quick reference. Each chapter is broken into three areas: a description section, an applications section and a typical operations section. Extras include a glossary of terms and definitions; a listing of operators, formulae and functions; a discussion of compatibility with Supercalc and Supercalc 2; and easy-to-follow installation procedures. Review questions are provided for instruction and for improving skills, and commands are dealt with in alphabetical order to facilitate easy reference.

Games for the Microbee Personal Computer — Wildcards 4
R. A. Burt, P. T. Ford *and* A. Nallawalla *(eds)*
Pitman, $15.95
Wildcards is a series of books written by Microbee users for other Microbee users who've finished reading their instruction manuals and would like to write programs and play games. Volumes 1, 2 and 3 covered various topics with the underlying theme of being 'tips and techniques', while Volume 4 comprises games which use PCG graphics, and includes several activities which are just for fun.

The Best of IBM PC Software
Stanley R. Trost
Sybex (ANZ), $37.95
According to author Stanley Trost, there are more than 3000 software packages for the IBM PC on the market today. In this book he presents the top 50 commercially available programs, evaluating the best word processors, spreadsheets, database management and communications packages, utilities, languages and operating systems. Each 'review' rates performance, ease of use, documentation and customer support, as well as providing information on the use of the program.

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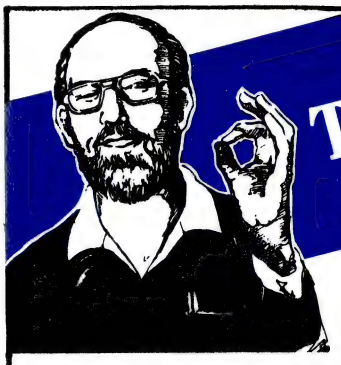

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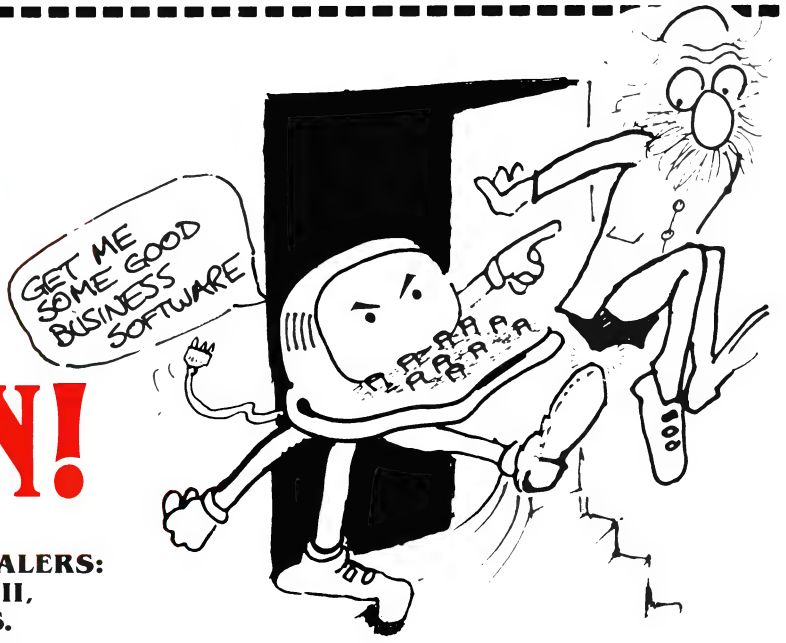

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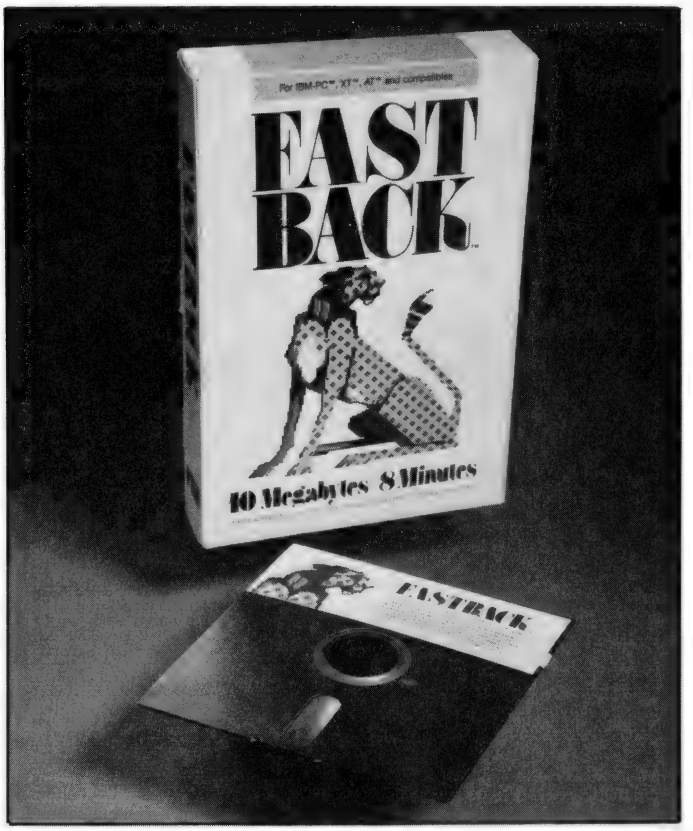

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(02) 957 2464
Price: $249 (excluding tax)
A utility designed to eliminate the need for expensive tape back-up systems for the IBM PC, XT and AT, and their MS-DOS workalikes. Supplied with its companion restore utility, Freestore, Fastback requires no additional hardware for its operation. Fastback and Freestore store 10 Mbytes in eight minutes and are fully file-oriented, so only the required files need be backed up or restored. Protection and checking facilities prevent accidental overwriting and intermixing of disk sets.

Flashprint for MS-DOS
JRT *Software*, (08) 278 7076
Price: $88
Flashprint lets you print almost anything on your dot matrix printer from within Wordstar. The CP/M version, reviewed in our September issue, costs $58. Our reviewer loved it, but yearned for an IBM PC version. Well, it's here. The MS-DOS version costs a bit more, but it has special enhancements for the IBM environment.

Games for the Commodore 64
Imagineering, (02) 212 1411
Price: $19.95 (cassette), $34.95 (disk)
Three new games for Christmas: Rescue on Fractalus, The Great American Cross-Country Road Race and Tour de France. Rescue combines strategy, action and flight simulation; Road Race tests fast driving reflexes and Tour de France swaps petrol for push-bike.

Mapper for PCs
Sperry, (02) 929 7800
Price: $4500
Sperry's Mapper system is well-known to users of mainframe computers. It's now available for Sperry and IBM-compatible micros. Described as a "general purpose, real-time report processing system and application generator", Personal Mapper allows free-form and column-formed report entry, storage, retrieval, updating and printing of results. It comes with an accessory board with 80 chips and 512 Kbytes of memory. When not using Mapper, the Sperry PC can use the extra RAM for itself.

Mview Videotex
Australian Caption Centre
(02) 212 5277
Price: $250
A low-cost videotex emulation package which can convert any IBM PC, Apricot or BBC into a videotex terminal with facilities such as double/single-height characters, coloured backgrounds and flashing text graphics. Mview can communicate with most Viatel-type systems throughout the world, and the package comes with an instructional disk and handbooks.

Sidekick for DG One and Toshiba T1100
Software Source, (02) 389 6388
Price: $147.95
These new 9 cm disk versions of Sidekick retain all the features of the IBM version. Sidekick provides instant access to an electronic notepad, calendar, phone directory and character chart from within most other applications programs.

Smart 2
Sourceware, (02) 411 5711
Price: $1095
An integrated business software package, which offers greater capacity and speed than its rivals, Smart 2 comprises three modules: word processing, database management and spreadsheet with graphics, each featuring a time manager and communications program. The Smart programming language is in simple English and contains conditional commands. The communications software enables automatic transfer of data.

Survive
McGraw-Hill, (02) 406 4288
Price: $135
Survive is a creative writing program for use on BBC Model B micros. Designed by David Harris for students in Years 8-10, it aims to increase the depth and excell- ▶

ence of student writing by taking the players on three adventures involving challenges, problem-solving and extended writing exercises. Many of the procedures involved must be carried out away from the computer and the program integrates many subjects from the normal curriculum.

Wordstar JX
Imagineering, (02) 212 1411
Price: $149
A range of software products to support the IBM JX computer (for school and home) has been released. One of the first packages to be announced is Wordstar JX, which features touch-typing design and dynamic page-break display, and can be customised so users can tailor the program to suit their needs.

TAS Database
Fletcher DP *Services*, (03) 537 2811
Price: $220
The Accounting Solution is a multi-user, relational (aren't they all!) database, aimed at first-time users and professional programmers. The language design is similar to Pascal and the system is based on a data dictionary. TAS runs on a range of 8-bit and 16-bit micros, including IBM, NEC, Tandy, Osborne, Kaypro, Altos and Discovery. Operating systems supported include MS-DOS, CP/M, MP/M and TurboDOS. A complete business accounting package is also available with TAS — source code included.

Dentics
Medibase Systems, (02) 692 9777
Dentics provides an integrated system which duplicates the daily management activities of dentists and streamlines their functions. Included is an appointments diary, clinical records system and automatic invoicing and account management systems.

New Machines

Amstrad CPC 6128
AWA-*Thorn*, (02) 638 8444
Price: $800
The CPC 6128 is a 128 Kbyte model, with built-in 8.5 cm disk drive and enhanced BASIC and CP/M Plus operating system. There's a choice of green or colour monitors, and the Logo language and an instruction program are included with the system. Virtually all existing CPC 464 software will run on the 6128, plus a large proportion of existing CP/M software. A built-in cassette interface allows existing taped software to be loaded.

◁ **Elite XT/32**
Sigma Data, (02) 436 3777
Price: $7537 (excl. tax)
This is a 32 Mbyte hard disk model of the Elite PC. It comes with 256 Kbytes of RAM, a serial port, a parallel port, 35.5 cm colour monitor and graphics adaptor, detachable keyboard, MS-DOS 2.11 and Concurrent CP/M operating systems and Open Access integrated software. The 32 Mbyte hard disk is split into two 16 Mbyte areas addressable by the MS-DOS operating system.

Hewlett-Packard Portable Plus
Hewlett-Packard, (03) 895 2895
Price: $4341
The Portable Plus features a full-size liquid-crystal display, 128 Kbytes of RAM (expandable to 896 Kbytes) and applications software resident in the 192 Kbytes of ROM. Two expansion drawers at the bottom of the Plus can be configured with additional ROM or RAM for a total capacity of more than 3 Mbytes' total ROM. An electronic disk, called an E-disk, provides non-volatile storage of data. Software currently available in ROM includes Lotus, MS-DOS, Microsoft/Word and terminal emulation.

Perito XT/AT
Perito Holdings, (02) 622 2793
Price: $6400 (PC/AT), $8400 (XT/AT)
The Perito is an Australian-built machine which combines features of the IBM PC and AT. It uses the Intel 80286 microprocessor (at 6 MHz) and provides 1 Mbyte of on-board memory with zero-wait states. It's claimed to be more compatible with the IBM PC and XT than the IBM AT, using a virtual machine emulation approach to resolve the 80286/8088 compatibility problem. Sounds interesting.

Services

Teledata Electronic Editing Service
Teledata Computer Communications Network, (03) 813 1133
Price: $150 (full), $50 (student membership)
An on-line electronic editing service which can be dialled from anywhere in Australia via Telecom's Austpac packet-switching network. Connections are available at 300 bps and 1200/75 (videotex standard), and copy is edited by graded journalists within 48 hours and uploaded back to the client's electronic mailbox. Visitor access is available to obtain fuller details on (03) 813 3522 (300 bps) or (03) 813 3733 (1200/75).

Videotex Equipment
Visionhire, (02) 92 0902
Price: Two weeks free, then $60 a month
Visionhire is offering 5000 Australian companies a two-week free trial of Videotex equipment, plus three hours' free use of the service, which includes share and stock market updates, foreign exchange information, credit checks, and travel and accommodation arrangements. If a company decides to continue the service it may keep the equipment on a 12-month rental basis for around $60 a month. □

Peripherals and Extensions

D30 and D40 Dot Matrix Printers
Thorn EMI, (02) 217 7700
Price: $799 and $1025 (excl. tax)
The D30 and D40 offer near-letter-quality or draft-quality print (180 cps maximum speed) with multiple-character pitch (10, 12 and 17 cpi), all easily selected using slide switches on the front control panel. They have both a parallel and serial interface as standard, and a 15 Kbyte memory buffer. The D30 is an 80-column printer; the D40 provides 132 columns.

Flexstor
Tallgrass Technologies
(02) 712 2010
Price: $2300 (excl. tax)
The Flexstor range of data storage systems allows users to upgrade without disposing of existing units. An add-in controller will interface two disk drives and one tape drive. The first Flexstor product to be released is an internal half-height 25 Mbyte hard disk, which includes all the features of the external drive in a compact design.

Hyperdrive
Symbiotic Computer Systems
(03) 836 4482
Price: $4000 (10 Mbyte), $5010 (20 Mbyte)
The Hyperdrive is an internal hard disk drive for the Macintosh. It's supplied with four utility programs: Manager, Security, Disk Backup and Print Spooler. Manager organises files for easy access and provides simple password protection; Security encrypts files for further protection; and Disk Backup and Print Spooler do what their names suggest. Symbiotic Computer Systems' dealers will install the drives (without voiding your Apple warranty).

IBM Colour Jetprinter
IBM, (02) 234 5678
Price: $1435
This printer is designed for business professionals who want to combine multi-coloured charts, graphs and high-quality text. The Jetprinter prints on 20 cm by 28 cm coated transparencies and on several kinds of coated paper, as well as on most kinds of standard bond paper. It prints in black, yellow, red, green, blue, cyan and magenta. The inks are stored in cartridges and flow onto the paper through four inkjet nozzles. It will provide resolution of 7559 dots per square centimetre with a double pass.

IBM Proprinter
IBM, (02) 234 5678
Price: $1130
The Proprinter prints at three speeds, ranging from 40 cps to 200 cps. An open slot in the front of the dot matrix unit can be used to feed single-sheet paper, multi-part forms or envelopes. Continuous-form paper is fed from the top. An all-points-addressable printer, the Proprinter can print graphs, charts or drawings with as many as 6803 dots per square centimetre.

IBM Quietwriter
IBM, (02) 234 5678
Price: $2725
Incorporating new technology developed by IBM, the Quietwriter uses a resistive-ribbon, non-impact technique to produce letter-quality text and quiet operation. Characters are 'painted' onto the page by a print mechanism working in combination with a special, multi-layer ribbon. It operates at 40 to 60 cps, depending on which of the four pitches is used.

IBM Wheelprinter
IBM, (02) 234 5678
Price: $3530
The last of IBM's new offerings, the Wheelprinter has automatic cut-sheet feed and continuous-forms feed as standard features. It uses a cartridge printwheel designed for high-volume printing and provides sharp definition. Maximum print speed is 25 characters per second, and it operates bi-directionally in any of four pitches.

Ioline LP3700 Plotter
Assco, (03) 873 2266
Price: $8900
The Ioline LP3700 offers continuously adjustable plotting from business card size to A0 size (including Architectural E size), the ability to accommodate roll or sheet media and intelligence to support AutoCAD and other CAD/CAM packages. Plot accuracy is realised through addressable resolution, selectable speeds and repeatability. Communication is handled through the standard 14 Kbyte buffer, dual RS232C ports and DM/PL IV-compatible firmware.

Proloader
Communication Control
(02) 597 2711
Price: $5940
Proloader is a high-speed software duplicator. Using 10 cm disks, the Proloader can accept 150 disks at a time. Formatting and duplication time is dependent upon the size of the program to be copied — usually taking from 45 to 75 seconds.

Sharespool
Interface Technology, (02) 438 2899
Price: $1268 for 64 Kbyte buffer
Sharespool is an IBM PC or HP150-compatible expansion board with buffer memory from 64 to 512 Kbytes. Three cables are attached to the adaptor board — one running to the serial printer and the other two connected to parallel or serial ports of two other computers. The Sharespool spools, buffers, queues and despools print jobs sent to it by the host and the other two computers, allocating its buffer memory as required.

Televideo 955 VDT
Data Peripherals, (02) 888 5733
Price: $1255
The 955 has two sets of 32 personalised function keys, allowing the user to switch between two applications without reprogramming. It has an 80/132-column display and up to four pages can be stored in each mode. Other features include a reconfigurable keyboard, line-by-line definable scrolling regions and a 'screen saver'. The screen measures 30 cm and is available in green or amber. A full tilt and swivel mechanism is standard. □

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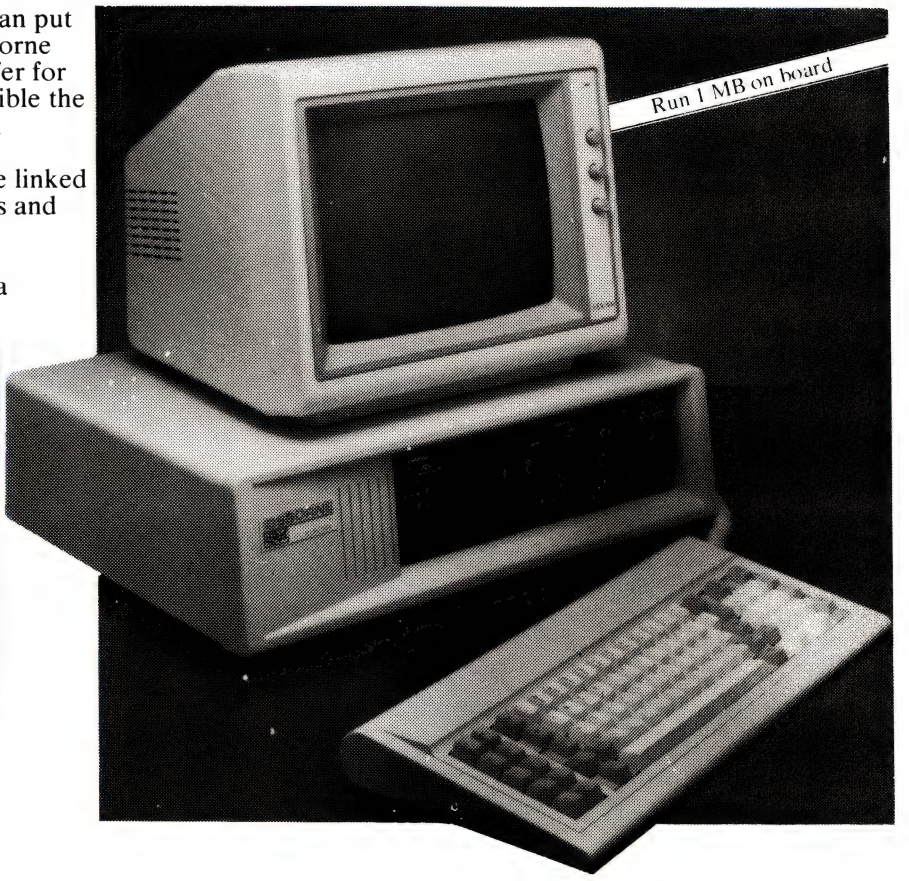

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GLOSSARY

A

Accumulator: The major register of a CPU, in which arithmetic and logical functions are performed. Some computers have several registers which can function as accumulators; in others, some registers can perform a subset of the full set of operations.

Acoustic Coupler: A device for connecting the telephone handset to data communications equipment.

Address: A memory location which can contain data or an instruction.

AI: Artificial Intelligence.

Algol: Algorithmic Language. An early computer programming language for mathematical applications. Widely used in Europe, it embodied early structured programming concepts and was a precursor of Pascal.

Algorithm: A set of instructions which define a method of obtaining some result (usually mathematical). A cooking recipe is an algorithm, as is a knitting pattern.

Alphanumeric: Composed of letters or numbers or both.

Analogue (Analog): Representation of a value by a voltage or some other measurable datum, rather than a binary or other representation based on counting.

Application: What you do with your computer. For example games, word processing and graphics.

Array: A set of values under a common variable name, accessed through a subscript. For example A|1| is the first item in array A, A|2| is the second, and so on. A|N| is the Nth item.

ASCII: American Standard Code for Information Interchange; a common system for representing character information.

ASM: Assembler. Also a suffix added to assembly language file names under CP/M to distinguish them from other files with the same name.

Assembler: A program which converts assembly language into its corresponding machine (or object) code, which can be executed by the computer.

Assembly Language: A language in which each machine code instruction is represented by a short mnemonic which is much more comprehensible to the programmer. For example, the 8080 machine code instruction: 10010110is: SUBL(subtract contents of register L from accumulator) in assembly language. Each line of assembly language becomes one machine instruction.

Assign: To make one thing equal to another; for example, |AB| assigns the value of B to A.

Attribute: A property possessed by some object, such as a file being read-only.

B

Background Task: In a multiprogramming environment, a low-priority program which runs when the processor has nothing else to do.

Backup: An extra copy of a disk, tape or file taken as a precaution against damage to the original.

Bandwidth: The range of frequencies that can be carried by a communications channel.

Base: The lowest number inexpressible as a single digit in a given number system.

BASIC: Beginners' All-purpose Symbolic Instruction Code. Invented in 1970 at Dartmouth College by Kemeny and Kurtz as a teaching language, it has since been enhanced in its more exotic forms into one of the most sophisticated yet easy-to-use languages available on personal computers. Its major rival is Pascal, which has the added virtue of stressing structured program design.

Baud: The number of bits transmitted per second along a data communications line.

BCD: Binary Coded Decimal, a 4-bit binary representation of the digits 0 through 9, with two BCD digits usually packed in a byte.

BDOS: Basic Disk Operating System. The major functional component of the CP/M DOS.

Binary: The base 2 system of counting used by digital computers.

Binary Search: A method of finding an entry in a table by successively halving the table until all that's left is the desired entry.

Binary Tree: A form of data structure in which entries are tagged on at the end of the appropriate branches.

BIOS: Basic Input/Output System. The part of the CP/M operating system which is different for each type of machine and provides any special I/O routines for disks, terminal, printer, and so on.

Bit: Binary digit, being the basic unit of data storage. Either 1 or 0, off or on, true of false.

Block: A physical division of data in a logical record.

Boot: To load the operating system into the computer from a disk or tape, either initially or subsequently after running a program.

Bootstrap: To use one short program to load a longer loader program which then loads the operating system.

Branch Instruction: A program instruction which causes the computer to jump to another instruction.

Buffer: An area of memory used for temporary storage while transferring data to or from a peripheral such as a printer or a disk drive.

Bug: An error in a program. Makes programmers itch.

Bus: A set of wires over which data, addresses, or control signals are transferred between the central processor and memory or I/O devices.

Byte: A computer word eight bits wide. A byte in memory can hold a character or a binary number between zero and 255 (or -128 and 127), or a computer instruction.

C

C: A programming language, developed at Bell Labs, which is particularly convenient for writing system utility programs.

Call: A jump to a subroutine which leaves the return address on the microprocessor stack, so when the subroutine is finished executing control returns to where it left off.

CBASIC: A commercial version of the BASIC language, running under the CP/M operating system. Doesn't use line numbers on every line, and is compiled, rather than interpreted like Microsoft BASIC.

CCITT: Consultative Committee on International Telegraphy and Telephony. The committee sets standards for various aspects of telephone and telegraph usage.

CCP: Console Command Processor. The part of the CP/M operating system that reads a command line and sorts out what it means.

Chain: To automatically run one program after another.

Character: A letter or number, or in some circumstances a control code such as 'carriage return'.

Checksum: A running total of the characters in a file, recorded or transmitted with the file so that errors can be detected.

COBOL: Common Business Oriented Language; a high-level language, mainly used in business applications.

Code:

Absolute: Machine instructions which are intended to be loaded and executed in a particular area of memory.

Object: Machine instructions, as distinct from the source code from which it was generated.

Re-entrant: Code which may be called by more than one program at a time.

Relocatable: Code which can be loaded and run anywhere in the computer's memory.

Source code: A program written in assembly language, or a high-level language such as BASIC, which must then be assembled or compiled to produce the object code which can actually be executed.

Cold Boot: To start up a system from scratch, loading the operating system from disk or tape.

Cold Start: See Cold Boot.

COM File: In CP/M parlance, a command file; that is, a machine code program that can actually be run.

Command: An instruction from the console for the system to do something.

Comment: A note added into a program to help the reader (or programmer) to understand its operation. Does not affect the program's execution in any way.

Compiler: A program which accepts as input a source file written in a high-level language, and produces as output an object file containing the machine instructions which are actually executed.

Concatenate: To join two strings together, one after the other

Conditional: A test; for example, is X greater than Y:

```
IF X > Y   THEN GOSUB 500
```
(BASIC)

GLOSSARY

Conditionals are one of the most powerful features of any computer language.

Configure: To organise the I/O or other aspects of a system.

Console: The keyboard and screen from which the operator controls the computer.

Control Characters: Codes which perform functions like acknowledging correct receipt of a message or requesting retransmission of an erroneous message. Control characters are defined as part of the ASCII and similar codes.

CP/M: A disk operating system for 8080- and Z80-based microcomputers. Allows the user to store information and programs in named files, as well as managing disk storage and input/output functions. Other disk operating systems include TRSDOS (on TRS-80), DOS 3.3 (for Apple) and MSDOS on many 16-bit micros.

CPS: Characters Per Second.

CPU: Central Processing Unit. The part of the computer responsible for fetching, decoding and performing instructions.

Crash: A situation where the system becomes inoperative, due to a hardware or software error.

CRT: Cathode Ray Tube. Usually refers to the screen of a video terminal.

D

Daisywheel Printer: A high-quality printer which has a printhead in the shape of a daisy.

Data: Information to be processed by, or output from, a program.

DBMS: Data Base Management System. A program which manages the systematic storage and retrieval of a centralised data pool.

DDT: Dynamic Debugging Tool. A program that assists the user to find errors in machine code programs.

Debug: To locate and fix errors.

Decimal: Based on ten.

Device: A piece of equipment such as a printer or tape drive which the computer uses.

Directory: A list of the programs on a disk (or occasionally tape) together with necessary information, such as length and location.

Disk: A flat, circular magnetic surface on which the computer can store and retrieve data and programs. Is fast compared with tape, particularly when information is not stored sequentially.

Disk Drive: The mechanical assembly which rotates the disk and positions the read/write head.

DOS: Disk Operating System.

Disk Operating System: A program which operates one or more disk drives automatically and manages the system.

Display: The computer's output device at the console, usually a TV-like display of letters and numbers; sometimes the computer can produce graphics (charts and pictures) on the display.

Distributed System: A system in which information is stored in several computers; peripherals may be shared, but the information storage is decentralised.

Dot Matrix Printer: A printer which creates a text image from a cluster of dots; produces relatively low-quality, high-speed text and graphic output.

Double Density: A method of recording twice as much information on a floppy disk, requiring a higher-quality recording surface than on a single-density disk.

Driver: A program which controls input and output to a device.

E

EBCDIC: Extended Binary Coded Decimal Interchange Code; an 8-bit character coding system — IBM's answer to ASCII.

ED: An editor program; part of CP/M.

Editor: A program which lets you alter and correct source files and other documents.

Error Message: Tells you something went wrong, and sometimes what.

Execute: To run a program; to follow its instructions.

F

FIFO: First in, first out. A technique used in memory management procedures, or a device used in buffering data flow between two asynchronous devices operating at different speeds.

File: A continuous collection of characters (or bytes) saved on a disk or tape for later reloading.

Fixed Point: Counting in integers only. Usually limited to small values, and restricted in accuracy, giving rise to ridiculous answers such as 9/5 1.

Flag: A variable, sometimes a single bit, which can have only two values and is used to indicate some condition.

Floating Point: The kind of arithmetic used in scientific calculators.

Floppy Disk: A disk, made of thin, flexible mylar, and enclosed in a card jacket, which can be used for magnetic storage. There are three varieties, 9 cm, 13 cm and 20 cm. These can typically store somewhere between 140,000 and three million bytes (characters).

Flowchart: Symbolic representation of the sequence of instructions in a program.

Focal: Formula Calculator. A simple language rather like a small BASIC, found on some mini and microcomputers.

FORTRAN: Formula Translator. One of the first computer languages, and beginning to show it, although still the king of the scientific or number crunching languages.

Function: A sub-program that processes variables in some well-defined way.

G

Garbage Collection: The process of going through memory or disk space, reclaiming all the redundant used space.

Gigabyte: One thousand megabytes (1,024,000,000 bytes).

Glitch: A pulse of electronic 'noise' which may cause a system failure.

Global: A variable which is known to all the parts of a program. See local.

H

Handshaking: A technique for controlling data communication between two devices; data flow only occurs when the receiving device sends a signal indicating it is ready to receive.

Hard Disk: A disk made of hard material, which is larger, faster and more fragile than a floppy disk, but capable of storing 70 million bytes or more.

Hard Copy: Printout.

Hardware: The bits of a computer you can kick, as opposed to the programs you can only swear at.

Hashing: A method of reducing the size of a table which otherwise would have mostly empty entries.

Hexadecimal: The method of counting to the base sixteen or the method of splitting binary digits into groups of four, which is the same thing. In hex, you count: 0 1 2 3 4 5 6 7 8 9 A B C D E F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21 22.

I

IC: Integrated Circuit.

Identifier: A label, or the name of a variable.

Index: A variable which usually points to an entry in a table or list.

Index Register: A processor register which is used to access tables and lists in memory.

Indirect Addressing: Referring to a variable which actually contains the address of another variable.

Inkjet Printer: A device which prints by electrostatically aiming a jet of ink onto the paper.

Input: To get data into the computer.

Instruction: A step the computer can perform.

Instruction Set: The range of commands which can be performed by a particular processor.

Integer: A whole number.

Integrated Circuit: A circuit built on a single chip of silicon.

Interface: The (hardware or software) connection between any two devices.

Intermediate Code: A special kind of object code which cannot be run directly on the computer, but must be interpreted.

Interpreter: A program which examines source code a line at a time, decides what it means, and then does it. Compare with compiler.

Interrupt: To electronically drag the computer away from what it is doing in order to respond to some time-critical situation.

I/O: Input/Output.

I/O-bound: A process in which the performance speed is limited by the speed of input/output.

GLOSSARY

J

Jump Instruction: Normally, control proceeds from one instruction to the next, one after the other. A jump instruction passes control, not to the following instruction, but to some other. Jumps can be conditional.

K

Kilo-: Prefix meaning one thousand.
Kilobyte: 1024 bytes (Kbyte).
Kilobaud: 1000 baud (Kbaud).

L

Label: A word which identifies the destination of a call or jump instruction, or simply identifies some location in memory.
LAN: Local Area Network.
Language: The set of instructions, and rules for stringing them together, which you use to instruct the computer what to do.
Laser Printer: A printer which works a bit like a photocopier, but uses a laser to draw an image directly onto the printing drum.
LCD: Liquid Crystal Display.
Library: A set of programs, or sub-programs, that can be called from your program so you don't have to waste space with a block of commonly used code; for example, a date routine can be held in a library.
LIFO: Last In, First Out. A device or data structure in which the most recent item stored is the first available for retrieval. A stack is a LIFO.
Line Number: A number at the beginning of a line, which identifies it in a similar way to a label.
Line Printer: A high-speed printer for computer output.
Link: Part of a data item in a list, which tells the computer the location of the next data item.
LISP: List Processor. A language much favoured by the artificial intelligence community.
List: A sequence of consecutive data items.
Load: To transfer some data or program into the computer memory.
Locate: To 'fix' a relocatable code so it will only run if loaded in a particular location.
Local Area Network: A system of interconnected computers, within a limited geographical space (usually in a single building).
Logical Device: A device as the computer 'sees' it: what the computer regards as the 'list device' may be one of several 'physical devices', such as a line printer or teletype.
Loop: To repeatedly execute a sequence of instructions; part of a computer program that is so executed.

M

Machine Language: The binary codes the machine actually executes.
Macro: A user-defined sequence of instructions which can be inserted anywhere in a program. See Library.
Macro-assembler: An assembler which can utilise macros.
MBASIC: Microsoft BASIC, the BASIC used in the TRS-80, PET, Apple II and so on.
Megabyte: One thousand kilobytes — 1,024,000 bytes (Mbyte).
Memory: Where the computer stores data and programs internally for fast access.
Menu: A display which offers the operator a choice of alternatives.
Microcomputer: A small computer based on a microprocessor.
Micro-floppy: A 9 cm 'floppy' disk, produced with a rigid plastic case.
Microprocessor: The central processing unit of a computer, built into a single silicon chip.
Millisecond: One thousandth of a second.
Mini-diskette: A 13 cm floppy disk.
MIPS: Million Instructions Per Second. A measure of processor speed.
Modem: Modulator/Demodulator. Device used to link a computer to the telephone line. It encodes digital bits into frequencies, and vice-versa.
MOS: Metal Oxide Semiconductor. Technology used for manufacturing high-density semiconductors. CMOS (complementary MOS) technology is characterised by low energy consumption, and is increasingly used in portable computers.
Mouse: A device connected to a computer which, when moved around on a desk, moves a pointer on the computer screen.
MP/M: A multi-user version of CP/M.
Multiplexer: Device used to divide a communications line among a number of users.

N

Nanosecond: One billionth (.000000001) of a second.
Nibble: Half a byte (4 bits).
Node: A connection point on a network.
Network: A system of inter-connected computers.

O

Object Code: Machine code.
Object File: A file containing object code.
Object Module: An object file containing part of a program, ready to be linked to others.
Octal: The system of counting to base eight, or grouping bits in threes.
Offset: To give the operating system the characteristics of a file so that it can subsequently read or write it.
Operand: The number an operator (+, -, and so on) operates on.
Operator: An arithmetic function or some other function which alters variables.
Optic Fibres: Cables made from thin fibres of glass (or similar material). Signals are encoded as light and transmitted along the cables.
Optimisation: Making a program work better (or faster, or using less memory).
Output: What the system produces.
Overlay: A technique for efficient use of memory space, in which different routines use the same memory locations. Routines using the same area are held in a backup store, and transferred into memory when needed.

P

Packed Data: Data which shares the same address, and has to be unpacked before use.
Packet Switching: A system of communicating data by dividing it into small packets addressed to particular receivers.
Page: A length of memory, typically 256 bytes.
Parallel Transmission: A method of moving data so that all elements of a compound unit are sent simultaneously. For example, the eight bits in a byte may be sent at the same time by using eight channels. This is the method used within the computer, and with some printers. Fast and expensive.
Parameter: A constant which sometimes has to be varied.
Parity: An extra bit on the end of a character or byte for error detection.
Pascal: A modern structured language which may eventually rival BASIC in popularity for microcomputers.
Password: A secret word the system may demand of you before allowing you access to certain (or all) programs or data.
Patch: A temporary (ha, ha) fix on a bug.
Peripheral: A piece of equipment the computer uses, like a printer, disk drive, or modem.
Physical Device: See Logical Device.
Picosecond: One trillionth (.000000000001) of a second.
PIP: Peripheral Interchange Program. A CP/M utility for copying files between devices.
PL/I: Programming Language One. A good general purpose commercial language.
Pointer: A variable used for indirect addressing.
Polish Notation: A method of separating operators and operands; for example, + 5 4 is Polish notation for 4 + 5.
Poll: To ask a peripheral if it requires service. For example, a processor will regularly check a terminal to see if it has output ready to be processed.
Port: A physical input/output connection point.
Postfix Notation: Also known as Reverse Polish Notation, this is similar to Polish; + 4 5 means 4 + 5.
Preprocessor: A program which does part of a job to make life easier for the program which follows; for example, a macro processor before an assembler.
Priority: The resolution of which interrupt is serviced first if two should arrive at the same time.
Process: A program.
Processor-bound: A process in which the limiting performance factor is the speed at which the processor can perform the re-

GLOSSARY

and ultimately followed by a computer.
Prompt: A message asking the operator or user to supply information.
Protocol: The rules governing the exchange of information between two devices.

Q

Queue: A list in which entries are made at one end, and removed from the other.

R

R/O: Read Only; cannot be overwritten.
RAM: Random Access Memory.
Random Access Memory: The computer's internal memory, which is used to hold running programs and data. The computer can write and read RAM.
ROM: Read Only Memory.
Read Only Memory: Internal computer memory used to store programs, which cannot be erased or overwritten.
Reader: Paper tape input device.
Read/Write Head: The small coil which reads and writes on the surface of a disk.
Real-time: A system in which the processing of data input to the computer takes place virtually simultaneously with the actions which generate the data.
Record: A set of related data items. For example, an employee's name, address, payroll number and pay rate.
Recursion: The ability of functions in some languages to call themselves.
Re-entrant Code: Code which can be used by several programs simultaneously, keeping separate data for each.
Register: A location in the processor capable of performing logical or arithmetic functions on the contents.
Relocatable: Capable of being moved in memory.
Relocatable Object Module: Part of a larger program consisting of many such modules, all linked together and located.
Resident: Permanently in the system.
Reverse Polish Notation: See Postfix.
RS232: (also RS232C) Registered Standard 232C. A widely used standard for connecting components in a computer system.
Run: To execute a program.

S

S100: A popular 100-line microcomputer bus, originally developed for the first 8080-based computer.
Save: To store a program on disk or cassette (particularly BASIC).
Screen: See CRT.
Sector: A section of data on a disk.
Serial Transmission: Movement of data one bit at a time. One byte will be sent as eight bits, one following the other. Cheap and slow.
Simulation: Making one system behave like another.
Software: Programs.
Source Code: The original text form of a program.
Source File: A file of source code.
Source Language: The language the source code is written in; for example, BASIC, Assembler, C.
Sort: To arrange items of data in order.
Spool: Simultaneous Peripheral Operations Online. A method of outputting information by queuing information for low-speed output devices, while simultaneously continuing other computer operations.
Stack: A list in which both entries and removals are made at the same end. A microprocessor usually has a hardware stack which is used to save subroutine return addresses, for temporary storage of data, and to pass variables between subroutines.
String: A sequence of characters.
Submit: To put the system under control of a file of system commands.
Subroutine: Part of a program which can be accessed from several points within the program.
Symbol: The name of a variable or a location in memory.
Symbol Table: A table constructed by an assembler or compiler to give the addresses of all variables and labels in a program.
System: A collection of hardware and software, possessed of the property that the whole is greater than the sum of the parts.
System Disk: A disk carrying the operating system.

T

Teletype: An electro-mechanical printer/keyboard.
Terabyte: One thousand giga bytes (1,024,000,000,000 bytes).
Timeshare: Running several programs on a system simultaneously.
Track: The area under the read/write head during one rotation of a disk.
Transient: A program that is only in memory for a short time before being overwritten. Often, the only program that is not a transient is the operating system.
Tree: A list in which each data item may refer to several others.
TTY: See Teletype.

U

UART: Universal Asynchronous Receiver/Transmitter. A device which handles the serial-to-parallel and parallel-to-serial conversion of bits in a data message.
Unix: A multi-user, multi-tasking, multi-programming operating system.
Utility: A program of use to most users.

V

Variable: Named quantity that can take on different values.
VDT: Video Display Terminal.
VDU: Video Display Unit.
Verify: To check that data written on a disk or tape can be read again correctly.
Viatel: Telecom Australia's videotext system.
Videotext: Also known as viewdata. A technology which uses slightly modified domestic televisions to access data from a computer database along the telephone lines. Prestel in the UK was the first such system. Australia's version is called Viatel.
Virtual Memory: A technique allowing programs larger than RAM to run. Only part is in memory. Parts are swapped from an online storage device as required.

W

Warm Boot: To reload the operating system a second or subsequent time.
Window: A part of a computer screen which has been divided into sections for displaying distinct information. On some systems which run a number of processes at once, each concurrent process may be displayed in its own window.
Word: The amount of data fetched from one memory location. Typically one byte, but can be two on recent processors.
Word Processor: A system for manipulating, editing, printing and formatting text files.
WordStar: A proprietary word processing program.
Word Wrap: A word processing function which automatically breaks lines exceeding the set right margin limit, and begins placing the words on the next line.
Write Protect: To remove the cover from the notch in a 20 cm floppy disk, so it cannot be written on. With 13 cm mini-floppies, the reverse action (that is, covering the notch) will write-protect the disk.

Z

Z80: A popular 8-bit microprocessor.

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Contributions to *Your Computer* are welcomed and will be given every consideration* Please read these notes carefully to get an idea of the style and format we prefer.

All Contributions: should include your name, address, and home and office phone numbers (in case we need to check details). Each page of your submission, and any material sent with it, should also carry your name.

Contributions by Telephone: Contributors who have modems and suitable software (in the MODEM7/YAM mould – see our stories on Christensen Protocols in the May and June 1983 issues) can arrange direct transfer to our computers through our Bulletin Board system, which is on-line 24 hours a day, seven days a week. Contact our office by phone for details on transferring material in this way.

Contributions on Disk: Contributions can be accepted in a wide variety of disk formats, although some have to be converted outside our offices, which will add to the (often lengthy) delay between receipt and acknowledgement. The preferred medium is IBM standard format single-sided, single-density, 20 cm CP/M disks. We can also handle, in-office, Kaypro II and Osborne 13 cm disks, and 13 cm Apple DOS or Apple CP/M disks. Please pack them extremely carefully if posting and label all disks with your name, address and phone number.

Listings: Unless it is absolutely impossible, we want listings produced on the computer. This reduces the risk of error – if the computer typed it, the computer probably accepted it. Print listings with a dark – preferably new – ribbon on white paper, and try to format the output to a narrow (40-characters) width. If they can't be produced on a printer, borrow a good typewriter – hand-written material is likely to sit around the office for a year before someone can find time to type it all out for you! Please provide an account of what the program does, how it works and so on. Any comments on the program should refer to the address, line number or label rather than to a page number. Any comments on modifying the program to work on other machines will be appreciated. Try to include a printout of at least part of a sample run if possible.

Style: All items should be typed (or printed) and double-spaced on plain white paper. We will only accept original copies – no photostats. Include your name, address, telephone number and the date on the first page of your manuscript (all manuscript pages should have your surname and page number in the top right-hand corner). Be clear and concise, and keep jargon and adjectives to a minimum.

*Although the greatest care will be exercised with contributions, no responsibility can be accepted for the safety or return of any letters, manuscripts, photographs or other materials supplied to *Your Computer* magazine. If return is desired, you should include a stamped, self-addressed envelope. If return is critical – say it's something you can't afford to lose – then don't send it; we *are* careful, but we're not perfect. □

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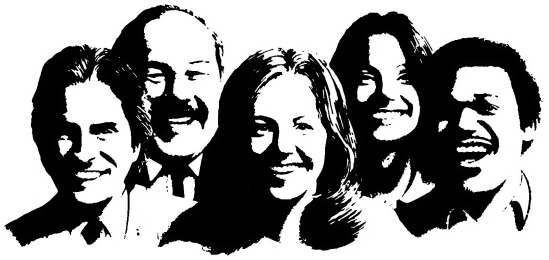

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CHRISTMAS COMES BUT ONCE TOO OFTEN

"Mummy, mummy, I want a VAX for Christmas ... Tommy says they have the best games. And I want a laser printer, and some software, and, and, and a BMX bike, too."

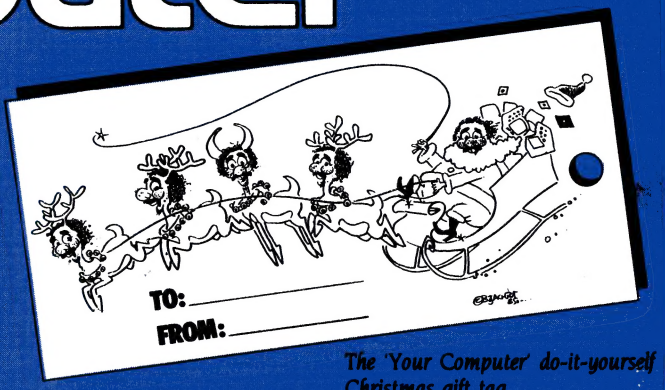
Okay, the heat's on. What *will* you buy the beastie for Christmas? No idea? Well, you need December's *Your Computer*: the issue with our big *Christmas Buyers' Guide*. You can't just leave it to Santa; he still uses elves, and knows nothing about computers. By the time our December issue reaches him, his sacks will have long been filled with low-tech (and he'll even forget the batteries, again).

So you're just going to have to pick your high-tech tree-hangers yourself, with a fair smattering of help from us. We'll be telling you what kind of machines, peripherals and software to buy for everyone and everything in your life (well, almost; there are only so many computer presents you can buy for the budgie, or for the bathroom).

We'll look at the sort of presents you could buy your child, your spouse, your friend, your enemy (that could be fun ... what about an IBM PC with a Z80 fitted in place of the 8088?), your boss (same again?), your secretary, your neighbour, your business, your grandmother ...

Okay, so you don't want to give granny a Microbee; but you do get the idea, don't you? We might even look at presents you can buy your computer (don't buy any for *Your Computer* — just send cash) and presents your computer can buy you. And we won't once mention the fact that whatever you buy for whoever, we *know* who it's really for ...

Perhaps you've already decided on your Christmas shopping list;



The 'Your Computer' do-it-yourself Christmas gift tag.

you should grab *December* anyway, because it will be filled with a whole stack of other interesting goodies, as usual.

First there's our co-feature on multi-user systems — after bringing ourselves out of the supermicro clouds, we'll take a workingman's look at the realities of sharing a computer with others. Is it a cost-effective solution for the growing business, or is networking the answer? Do you want a powerful single processor doing the work, or does the real solution lie in multi-processor systems? And how do multi-user systems work, anyway?

Also in December, we've got reviews down to a T. We'll start with the *Texas Instruments Prolite, then move on to the all-singing all-dancing Toshiba* P351 printer and Osborne's *Transnet* networking system. We'll also try to look at *The* IBM IX and some *Top-secret* new machines that Les has been examining.

As if that's not enough ... we also have the regulars, user columns, news, new products and more, and the ever-educational tutorials on C *Programming*, *Using PCs in Marketing*, and *Structured Programming*. Not least, and not even last, we'll see the return of *Programmer's Workbench*.

AND FOR OUR NEXT TRICK ...

You think we're about to tell you what's going in the January issue, don't you? You're wrong. We're working on a big special in January, but you'll just have to buy December to unravel the last great mystery of the century. We refuse to be budged from our secretive shroud (well, at least not until we know for sure that our plans for the special issue have succeeded!).

We can let you in on the major theme for our February issue, however: that issue will mark the fourth anniversary of Applied Technology's launch of the Microbee, through the pages of *Your Computer*. We're both going to celebrate with a special feature on *Microbee Systems*, one of the real success stories of Australian high-tech industry.

We already have our spies crawling around the rafters of the company's Gosford, NSW, factory in a quest for detailed information on some fascinating new machines. Reports so far are sketchy, but promising, despite the fact that our special agent assigned to eavesdropping on Owen Hill's conversations says he's been talking a lot of Russian lately. Untranslatable phrases like "Sixteen Bitski? No worries, Comrade" litter the radio waves being beamed back to the YC office.

We expect to have uncovered the full story before February. Meanwhile, work has already begun on the *Personal Computer Of The Year* awards, and we'll use the March issue to give all the finalists a shakedown. That issue will be devoted to finding the best buys on the Australian market, so it will be interesting to see how many PCOTY finalists (the best machines released this year) make the grade when compared to the best available overall.

Answers to the thirteen most asked questions about Sony's new Model 10.

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